VSB —TECHNICAL UNIVERSITY OF OSTRAVA
FACULTY OF ECONOMICS

DEPARTMENT OF FINANCE

Analýza příčin a důsledků fiskální nerovnováhy ve Spojených státech
An Analysis of Causes and Consequences of US Fiscal Imbalance

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Bibliography
List of Abbreviations
Declaration of Utilisation of Results from the Diploma Thesis
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Annexes

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The declaration

"Herewith I declare that I elaborated the entire thesis, including all annexes Independently."

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Content

1 Introduction

In the 21th century, American fiscal balance is gradually being severely imbalance, expect fiscal surplus in the period of Clinton administration, the fiscal balance was deficit in last 30 years.

After financial crisis in 2008, due to the fiscal deficit and national debt became bigger and bigger. More and more people started to pay more attention and concern more in US fiscal deficit and national debt. As the biggest economy in the world, US fiscal imbalance and debt situation will influence global economic development as well as people's life standard.

The goal of the thesis is to analyze the causes and consequences of US fiscal imbalance, furthermore, we estimate and analyze US long run public finance sustainability based on the historical data and projected data.

The thesis can be divided into five parts. The first and the last chapter are introduction and conclusion, the part 2 is the description of fiscal theory, the performance of US fiscal situation is in part 3, then the part 4 is the long run finance sustainability.

The part 2 is principle part, it includes 7 parts. at the beginning we briefly introduced fiscal balance, then interpret the government revenue and expenditure in the second parts. Thirdly, we introduced the detail of debt and the ways to reduce debt. The fourth, it is the causes and causes and consequences of fiscal deficit. Furthermore, we described the alternative budget balance and fiscal gap. The principles of fiscal and debt sustainability are in the end.

In the part 3, at the beginning, we based on the historical fiscal to introduce detail of the US fiscal situation from 2003 to 2016, which includes the structure of federal revenue and expenditure. Next, we described the debt situation in last 12 years, it involves the detail of public debt, some different types of marketable securities, maturity of debt as well as the change of treasury yield rate.

In the part 4, we mainly based on the data in US government official website to introduce and analysis the projection of US fiscal budget in next 10 years, which includes the detail of projected revenue as well as the projected expenditure. Then, we used alternative measures to analysis the causes and influence of deficit, those are current balance, primary

balance, structure and cyclical balance. Next, we analyzed and interpreted the fiscal gap based on historical and projected budget. In the end, we used several ratios to analyze the US long run finance sustainability, which consists of public finance sustainability, external debt and public debt sustainability.

2 Description of Fiscal Theory

In this part, we will describe some theory part of fiscal theory, it is foundation of our thesis which will be used to analysis and interpret the US federal fiscal situation over time period.

2.1 Fiscal balance

It is the relationship between federal revenue and federal expense, and it is the amount of money the government gets from taxes and assets taking into account spending. If this balance is negative there is a deficit and when it is positive than there is surplus or profit.

The formula of fiscal balance:

$$\text{government revenue} - \text{government expenses} = \text{deficit or surplus.} \qquad (2.1)$$

A fiscal deficit occurs when, in a given year, a government spends more than it receives in revenues. On the other hand, a government will run a surplus when revenues exceed expenditures.

2.2 Government revenue and government expenses

Government revenue and government expenses are the basic factors in fiscal balance, in this part, we will separately introduce detail of government revenue and expenses.

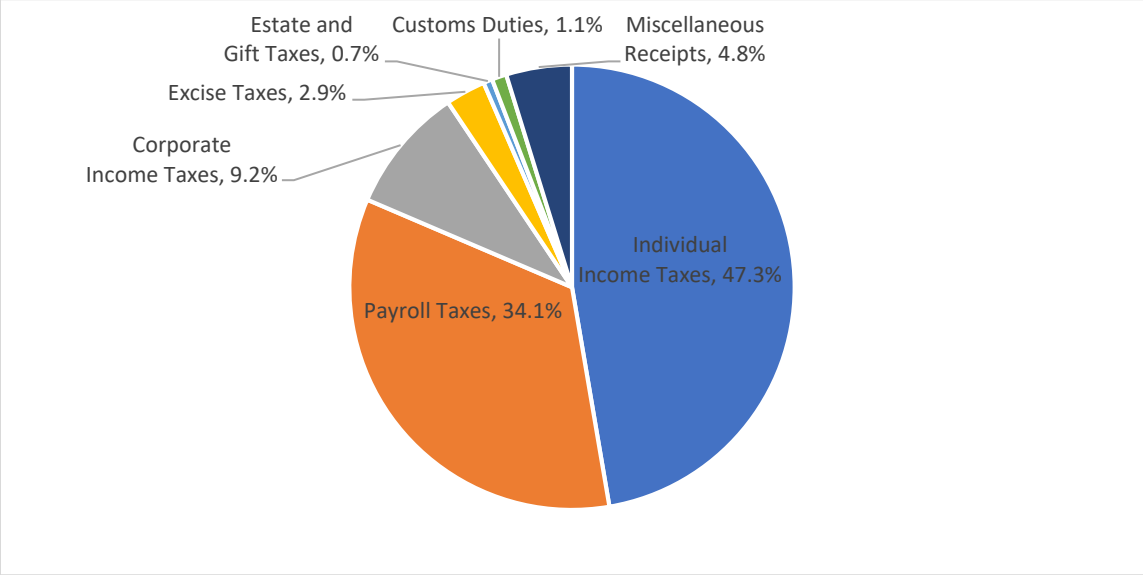
2.2.1 Federal Government revenue

Government revenue is money received by a government, and it is an important tool for fiscal policy. There are three main sources of government revenue which are separately tax revenue, non-tax revenue, and capital receipt. Non-tax revenue is the revenue not generated from taxes, such as money from other's help. Loan from monetary fund or other countries, sale of state assets and so on. For capital receipt, the federal revenue of capital receipt is the national debt.

Due to the US special political system, federal tax revenue is different with state and local government. State government's revenue is mainly from income tax and sale tax. On the other hand, property tax is main resource for local government.

In the account of federal government revenue, mainly caused by tax, then is Miscellaneous Receipts which belongs to non-tax revenue.

Figure 2.1 the federal government revenue in 2016



Source: Congressional budget office

There are three main resources of federal government's revenue, individual income tax almost covers half of total federal revenue, then is payroll taxes and corporate income tax which also cover large ratio in total revenue. Not only that, it also consists excise tax, estate and gift taxes as well as customs duties.

2.2.2 Federal Government expenditure

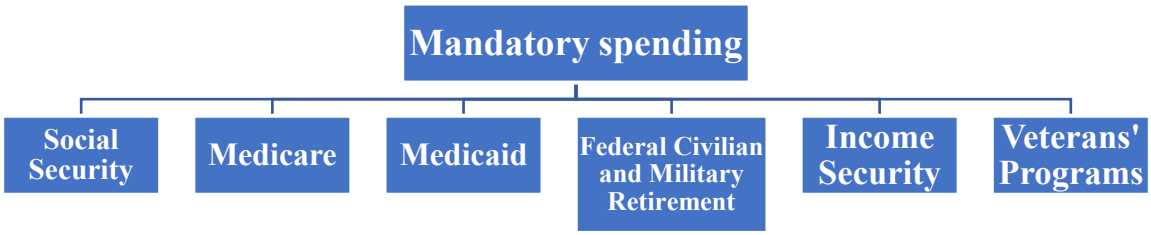
Government expenditure includes government consumption, investment and transfer payment. Consumption and investment refer expenditure of military, administrative management and infrastructure. In contrast, transfer payment is the government spends money in social security, fiscal subside and so on.

Federal government spending in the United States can be broken down into 3 general categories: mandatory spending, discretionary spending, and interest on government debt.

Mandatory spending is government spending on certain programs that are mandated by law, these programs are outside of the annual appropriations bill process and government

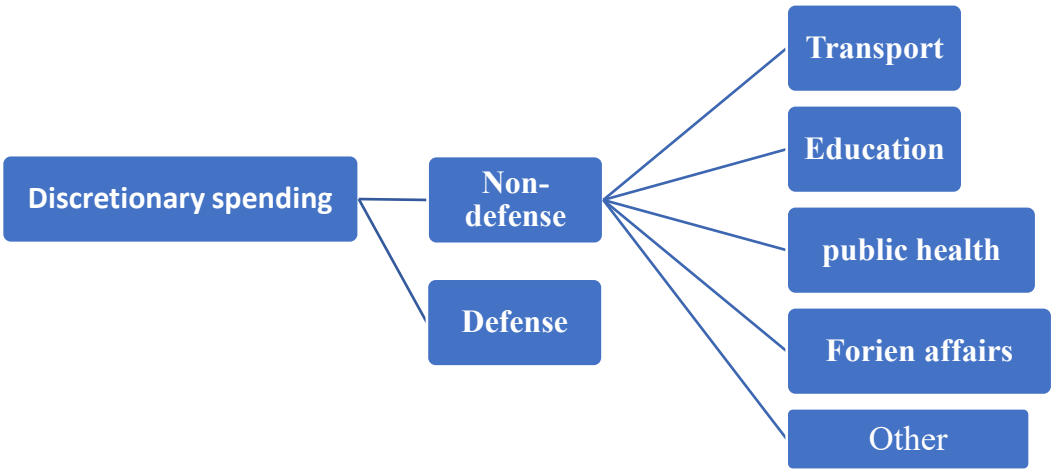
must to pay for them. The amount of mandatory can be adjusted, only if more than 60 vote passes in authorization law.

Figure 2.2 Main components of mandatory spending



Discretionary spending is optional spending that is determined by congress each year through an annual appropriations process, each program must be passed by the most of member in congress. It comprises the defense spending and non-defense spending, the defense spending mean Spending attributable to the maintenance and strengthening of the United States armed forces. For non-defense spending, it includes some items in the table 2.2.

Figure 2.3 Structure of discretionary spending



Interest expenditure is the spending government pays as the cost of money borrowing, in the other words, it is the cost of the national debt. Government generally use the tax revenue

to pay, however, when the government has more pressure in spending, they will issue more debt to pay interest instead of using of tax revenue.

2.2.3 Federal Debt

Debt is one of the most important way for government to borrow money and finance their budget, it is not recorded in account of government revenue, because it belongs to government balance sheet rather than income statement. For national debt, it is can be divided into two main parts, held by federal government account and held by the public.

Government Account Series securities held by Government trust funds, revolving funds, and special funds; and Federal Financing Bank securities. Intragovernmental debt is incurred when the government borrows from federal trust funds to help fund current operations.

For **public debt**, it includes marketable security and saving bonds, they are debt instruments issued to raise money needed to operate the federal government and pay off maturing obligations. However, saving bonds is a government bond that offers a fixed rate of interest over a fixed period of time. They are not subject to state or local income taxes. These bonds cannot easily be transferred and are non-negotiable. In contrast, marketable security can be transferred and sold for cash in secondary market, which composed by several securities.

Table 2.1 Marketable security

	Term	Maturity	Interest rate	Liquidity and safety
Treasury bill	Short	4,13,26,52 weeks	Low	Liquid and safe
Treasury note	Intermediate	2,5,10 years	Intermediate	Safe
Tips	Intermediate	5,7,10,20 years	Upper meddle	Relatively safe
Treasury bond	long	30 years	High	Safe

Source: www.treasurydirect.gov

Tips is Treasury Inflation-Protected Securities which provide investors with protection against inflation, TIPS increase with inflation and decreases with deflation. Therefore, comparison with other marketable securities, it is relatively safe.

2.2.3.1 Ways to reduce federal debt

Debt can be good way for countries to get extra funds to invest in their economic growth and release fiscal pressure in budget, however, too much debt would impede a country's development, even bankrupt, due to low economic efficiency with using of debt, no enough money to pay back, like Greece, Mongolia.

There are some ways for reducing federal debt.

Interest Rate Manipulation

Government can enhance cooperation with central bank and maintaining low interest rates, which is another way governments seek to stimulate the economy, generate tax revenue and, ultimately, reduce the national debt. low interest rate is beneficial for individual and corporates to borrow money and spend on consumption, which is better for providing more job creating as well as tax revenue, it will lead to the low deficit. Moreover, low interest rate is not more attractive for investors than high rate, then government has to borrow less money to finance budget. However, if a country's economic efficiency is low under the low interest rate, debt will be heavy burden.

Spending cuts and raise tax

Spending cuts and raise tax are the useful way to reduce debt, which the result will be obvious. Government can only carry out spending cut or raise tax, even carries out two ways at same time. Even if it would be good in reducing debt, however, it will anger voters and tax payer, not good for politicians.

Development of Business and Trade

The development of business and trade can be other good way to reduce debt burden. Because the growth of trade can push the development of country's economy, furthermore the increasing of GDP can slow down the debt ratio, even reduce the debt ratio.

Behavior of Central bank

Governments can seek cooperation with central bank, central bank enables to implement expansionary monetary policy for lending money to government, then it would cause currency depreciation. Furthermore, the actual amount of debt government need to pay back is less than the amount of debt in original exchange rate. However, it also causes the influence trade and people's life.

2.3 Causes and consequences of fiscal deficit

In this part, we will introduce detail what can cause the fiscal deficit, and what economic situation and social situation will be caused by fiscal deficit.

2.3.1 Causes of fiscal deficit

A budget deficit occurs when tax revenues are insufficient to fund government spending, meaning that the state must borrow money, usually in the form of treasury securities.

Cyclical reasons

For many countries, the increasing of budget deficit is the result of experiencing a recession or a sustained period of slow growth. During the period of rescission in a country's economy, government generally decreases the tax revenue, meanwhile required to increase the government spending for releasing pressure of corporates and citizen, for example the income support, unemployment benefit.

the deficit under cyclical reason is the consequences of the automatic stabilizers at work**,** which mean tax revenue and government spending will be adjusted automatically at different stages of business cycle. Fiscal deficit will diminish when economy recovers, fiscal balance even can be surplus during economic boom.

Structural reasons

The deficit of structural reasons is difference with the deficit of cyclical reasons, it won't be influence by business cycle, which mean the deficit will increase when economy is in boom. These problems may lead to deficit.

Firstly, Tax avoidance and tax evasion, it can lead to the missing of large amount of tax revenue during economic recovery or boom. Secondly, the serious imbalance of income, because rich people do not want to pay more, poor people has no enough money to pay. Thirdly, high level of government subsidy, even if economy is fine, federal government will be convinced by congress to provide financial support in some weak industries, like steel, farm and oversee trade.

2.3.2 Consequences of fiscal deficit

Fiscal deficit is associated with our economic growth, people's life, social stability and many parts. In this part, we will introduce some significance impact of fiscal deficit.

Rise in national debt: Due to the happen of fiscal deficit, government need borrow more money from domestic and external to support budget for next fiscal year. Not only that, if the increasing of tax revenue is lower than growth of debt, because of large amount of interest payment, fiscal deficit will be higher.

High tax rate: Increasing of tax rate is the directly way to release fiscal deficit, however, it will increase pressure to individual and corporates, and it is not better for the new president selection.

Currency might appreciate: With the growth of debt and deficit, if government can't be effective to pay back, government will force central bank to increase interest rate for being easier to attract investors and borrow money, then it would cause the appreciation of currency, it leads to the trade deficit increasing, and the decreasing of domestic production.

Risk of default: When a debt gets too high for a country to pay, the country might default or fail to pay interest in time. It would lead to more interest should pay, because lender will increase interest rate. It also causes creditors lose money, then the rating of government will decrease, furthermore, if government continually want to borrow money, it will be so hard, and many long-term projects might stop due to the lack of money.

Standard of living go down: Because of the domestic currency depreciation, the export product will be more expensive, not only that, government and central bank will increase

interest rate to attract more capital and keep price level stable, then it is hard for people to borrow money for consumption, because the cost of borrowing will be also high.

Impact of Public investment and private investment: A government may run a budget deficit to finance infrastructure investment. This could include building new roads, railways, more housing and improved telecommunications. This public-sector investment can help increase long-run productive capacity and enable a higher rate of economic growth. However, according to crowd out effect, with the increasing of government investment, it increases the interest rate and the cost of borrowing, then social investment will be crowded out by government investment.

Decreased national saving and future income: Increased federal debt would crowd out private investment, leading to reduced labor productivity and real wages, which in turn, could reduce individuals' ability to earn and save.

It is normal to exist the fiscal deficit for each government, and it is also beneficial in GDP growth, only if the return of investment is higher than interest rate, fiscal deficit will be more effective.

2.4 Alternative Budget Balance

The standard definition of fiscal deficit is generally called conventional deficit, which measured the total government revenue and expenditure. However, many alternative measures have been developed to measure the impact of government activities.

In this part, we will introduce some important alternative measurements which might be used in the analysis section.

Current balance

It measures the extent of government saving, under the total balance, excluding the investment outlay and capital revenue, for example the sale of assts. It can reflect the government fiscal situation without the influence of investment factors. The computation is as follows:

$$\text{Non} - \text{investment revenue} - \text{non} - \text{investment expenses} = \text{Current balance}. \quad (2.2)$$

The current balance calculation omits investment outlays and capital revenues. Generally, it was commonly held that current expenditures should be fully financed by taxes, which mean the non-investment refers to the government tax revenue, and the non-investment should exclude the interest payment.

Domestic balance

It considers some components of total balance that arise from transaction within domestic economy and omits affecting balance of payment directly. As the formula:

$$\text{total balance} - \text{external balance} = \text{domestic balance}. \quad (2.2)$$

$$\text{external revenue} - \text{external expenditure} = \text{external balance}. \quad (2.3)$$

External revenue generally refers the revenue from foreign tax payment, for example, the more foreign oil import to domestic, they will pay more tax, then causes the low external deficit, furthermore domestic deficit will be low. Government expenditure on domestic goods that is fully financed by foreign grants increases aggregate demand.

Primary balance

Provides information about the impact of current year transaction on public finance, the measure excludes the interest payment from conservational deficit, the primary balance could also reflect the success of policies in moving the economy towards a sustainable growth.

$$\text{total balance} - \text{interest payment} = \text{primarybalance}. \quad (2.4)$$

The primary balance measures how current actions improve or worsen the public sector's net indebtedness, and it is important for evaluating the sustainability of government deficits. If the primary balance has large gap with standard balance, which reflected government spends too much money in cost of debt rather than society and economy and implied the government efficiency would be low.

Cyclical and Structural balance

The cyclical balance is caused by the ups and downs of the business cycle. When the business cycle is in recovering or boom, fiscal balance would be surplus or the smaller fiscal deficit. In contrast, it happens high fiscal deficit.

For structural balance, it is a balance that happened under the situation of full employment in society and not caused by any short term macroeconomic fluctuation, which mean the deficit would be high when a country's economy is in boom. As the formula:

$$\text{Structural balance} + \text{ cyclical balance} = \text{ total balance}. \tag{2.5}$$

$$(\mathrm{G} - \mathrm{t} \cdot \mathrm{PGDP}) = \text{ structural balance}. \tag{2.6}$$

$$(\mathrm{G} - \mathrm{t} \cdot \mathrm{GDP}) - (\mathrm{G} - \mathrm{t} \cdot \mathrm{PGDP}) = \text{ cyclical balance}. \tag{2.7}$$

$$\mathrm{t} \cdot (\mathrm{PGDP} - \mathrm{GDP}) = \text{cyclical balance}. \tag{2.8}$$

where t is tax rate which is calculated by total tax revenue divides by nominal GDP; PGDP means the potential GDP which is the total output under full employment. GDP gap is the difference between potential GDP and nominal GDP. $(\mathrm{G} - \mathrm{t} \cdot \mathrm{GDP})$ is actual deficit, which G is government expenditure.

When GDP gap is positive, the cyclical budget balance will be surplus, the bigger cyclical balance, the smaller structural balance; On the other hand, when GDP gap is negative, cyclical balance would cause low structural deficit, the lower cyclical balance, the bigger structural balance. In general, the positive output gap means economy exists inflationary pressure; The negative GDP gap reflects high unemployment and deflation risk.

2.5 Fiscal gap

The fiscal gap is a country's excess of total expenditures over available current and future resources. It is also an estimate of how much the government's spending and debt obligations exceeds its revenues over a specified period. Based on the fiscal gap, it is useful for government to estimate how much noninterest spending must decrease or how

much revenue must increase for the federal government to reach an assumed debt-to-GDP ratio by the end of period.

$$\mathrm{FG} = \mathrm{PVE} + \mathrm{PD} - \mathrm{PVR}\,. \tag{2.9}$$

Where FG is the fiscal gap at time t, PVE is the present value of projected expenditures under current policies at the end of period, but it excludes interest payment. PVR stands for the present value of projected receipts under current policies. PD means the federal debt held by public.

On the other hand, the fiscal gap can be considered that the sum of primary balance and public gap, when the primary balance is low, it would cause the increasing of public debt, furthermore, it leads to the high fiscal gap. Therefore, the fiscal gap can be used to measure how much primary balance must increase for decreasing debt situation.

A non-zero fiscal gap means the government is not able to finance it expenditure at same time, government need to adjust policy to decrease the gap. Otherwise it looks like snow ball, larger and larger, furthermore it would cause some serious economic and social issues, as we mentioned in the part of consequences of fiscal deficit.

2.6 Fiscal sustainability analysis

Fiscal sustainability analysis consists of sustainability of public finance and debt, it can be used to measure if the government is able to achieve a fiscal stance that allows it to serve public debt in short run and long run.

2.6.1 Sustainability of public finance

There are two traditional measures separately represent the long run and short run sustainability, they are debt to GDP ratio and deficit to GDP ratio.

Debt to GDP ratio

The debt-to-GDP ratio is the ratio between a country's government debt (a cumulative amount) and its gross domestic product (GDP) (measured in years). By comparing what a country owes to what it produces, the debt-to-GDP ratio indicates the country's ability to pay back the money borrowed by government.

$$\frac{\text{National cumulative debt}}{GDP} = GDP\ ratio. \quad (2.9)$$

The debt-to-GDP ratio is used to determine the health of an economy. A low debt-to-GDP ratio indicates an economy that produces and sells goods and services sufficient to pay back debts without incurring further debt. On the other hand, the high debt to GDP ratio represents large amount of GDP needs to be pay back for debt, and it means the less probability the country will pay back the money government borrowed, and the risk of default.

However, it is not necessarily bad with high debt to GDP, for example USA and Japan, their debt ratios separately are more than 200% and 100%, even if their ratios are high, but they still don't happen debt crisis as same as Greece. Due to the reason of buyer of debt and economic growth. Firstly, Japanese government mainly borrow from domestic, for united states, federal government debt is mainly bought by China and japan, and they are the biggest repeat buyers. Secondly, they have strong economy to support the repayment of debt, and the increasing of economic growth is higher than the growth of debt.

Deficit to GDP ratio

Deficit ratio is indicator which used to measure the short run fiscal sustainability and fiscal risk, it refers to the ratio between the fiscal deficit and GDP at the same fiscal period. The formula is as follow.

$$\frac{\text{Fiscal deficit}}{GDP} = deficit\ \text{ratio}. \quad (2.10)$$

The different level of deficit represents the degree that government distributes the social resource. The higher high deficit ratio means the more social resource government distributed, it will confuse the economic running as well as the growth of debt in long run, furthermore leads s series of economic and social issues which we mentioned in part of consequences of fiscal deficit.

2.6.2 Debt sustainability

In this part, we mainly introduce the measures of external debt and public debt, because they are the important types of debt for each country and cover large proportion in total debt.

2.6.2.1 Sustainability of external debt

External debt (or foreign debt) is the total debt a country owes to foreign creditors, the debtors can be the government, corporations or citizens of that country. The debt can be owed from private commercial banks, other countries' governments, or international financial institutions such as the International Monetary Fund (IMF) and World Bank.

Table 2.2 Indicators of external debt sustainability

Indicator	Formula
External debt to exports ratio	external debt/export
Gross debt to export ratio	total debt/export
External debt to current revenue ratio	external debt/tax revenue
External debt to total revenue ratio	external debt/ reveue
External debt ratio	external debt/ GDP
Debt service to GDP ratio	debt cost/ GDP

Source: IMF "External Debt Statistics

External and gross debt to export ratios are defined as the ratio of total debt and external debt at the end of the year to the economy's exports of goods and services for any one year. It can be used to measure a country's ability that uses the earning from export to support the total debt and external debt.

The high ratios reflect the increasing of debt is faster than external income, which indicated the efficiency that country used the borrowing money from outside to produce and export is low, it implies the country may have problems meeting its debt obligations in the future.

External to current and total revenue ratios are the percentage of the tax revenue and total revenue that go toward paying a country's external debt. It is used to measure if government has ability to use tax revenue or total revenue to pay back external debt.

Generally, the higher ratios government has, the more difficult government pay back debt with fiscal revenue, and it will face the pressure of high debt ratio.

External debt to current revenue ratio is less than total revenue ratios, because total revenue includes tax revenue, non-tax revenue and capital receipt. Comparing external debt to current ratio with total revenue ratio is useful to analysis performance of tax revenue in external debt.

External debt ratio represents the total amount external debt in total amount of GDP. It can used to measure the government's ability that produces and sells goods and services sufficient to pay back debts from oversea without incurring further debt. low ratio indicates a country's economy can be sufficient to pay back external debt. In contrast, high ratio reflects a country's economy is not effective to deal with the external debt well, moreover it may increase the government borrowing and bring potential debt burden in future.

Debt service to GDP ratio illustrates how much proportion of interest payment in total amount of GDP, which evaluates the level of interest payment. The high debt service ratio means government need to pay more debt cost from total GDP, and it will increase government burden in budget. On the other hand, the low debt service ratio illustrates the interest payment won't cause too much burden to government.

2.6.2.2 Sustainability of public debt

Public debt is the most important in a country's total debt, which mean government mainly borrows many from public investors. In general, it covers more than tow third of total debt, for example the united states. The formula of public ratio is as follow:

$$\frac{\text{Public debt}}{GDP} = public\ debt \text{ ratio}. \qquad (2.11)$$

Generally, the high public debt ratio means the low efficiency government borrowed money for development, moreover it implies the risk of default. Furthermore, government must increase interest rate for attracting more public, then more debt cost will happen in government's budget.

In the long run, to avoid burden of high debt ratio, governments must be careful to find that sweet spot of public debt, which mean using debt in efficiency way. It must be large enough to drive economic growth, but small enough to keep interest rates low for decreasing debt cost and budget burden.

3 US Recent Fiscal Performance Analysis

In the chapter 3, we mainly introduce the US fiscal situation in last 14 years from 2002 to 2016, and we analysis and describe the US fiscal situation in last 14 years through form of table and graph.

The chapter can be divided into 4 parts. At the beginning the overall situation of government budget will be introduced, then separately describe and analysis the detail of government outlay and revenue, furthermore is debt situation and the budget in last several years.

3.1 Overall situation of fiscal performance

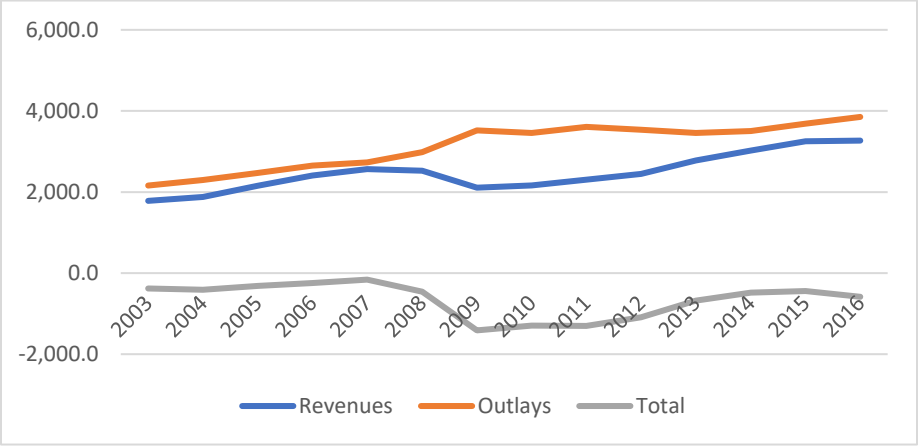
In this part, we will present and analysis general performance of government deficit.

Table 3.1 Overall situation of US performance

	Revenues	Outlays	Total	Revenues	Outlays	Total
	In Billions of Dollars			percentage of GDP		
2003	1,782.3	2,159.9	-377.6	15.7	19.1	-3.3
2004	1,880.1	2,292.8	-412.7	15.6	19.0	-3.4
2005	2,153.6	2,472.0	-318.3	16.7	19.2	-2.5
2006	2,406.9	2,655.1	-248.2	17.6	19.4	-1.8
2007	2,568.0	2,728.7	-160.7	17.9	19.1	-1.1
2008	2,524.0	2,982.5	-458.6	17.1	20.2	-3.1
2009	2,105.0	3,517.7	-1,412.7	14.6	24.4	-9.8
2010	2,162.7	3,457.1	-1,294.4	14.6	23.4	-8.7
2011	2,303.5	3,603.1	-1,299.6	15.0	23.4	-8.5
2012	2,450.0	3,536.9	-1,087.0	15.3	22.1	-6.8
2013	2,775.1	3,454.6	-679.5	16.8	20.9	-4.1
2014	3,021.5	3,506.1	-484.6	17.5	20.4	-2.8
2015	3,249.9	3,688.4	-438.5	18.2	20.6	-2.4
2016	3,268.0	3,852.6	-584.7	17.8	20.9	-3.2

Source: Congressional budget office

Figure 3.1 Overall situation of US performance (billions of US DOLLAR)



It is clearly to see in figure 3.1, the general trend of government revenues and spending was generally increasing in last 14 years, however, the total amount spending in last 14 years were above revenue, it caused the balance of fiscal performance was deficit in previous years.

There is a significant time point in figure 3.1, which is 2009 the years after one years of financial crisis explored. It is obvious to see the expenditure raised sharply as well as the significant declining of revenue, it leaded to the large deficit in 2009, which was almost 1.4 trillion of US dollar. Due to financial crisis, bank bankrupted, stock market crashed, industries stopped running, unemployment and some serious social problem, central government carried out the expansionary fiscal policy to increase government expenditure for stimulating economy from recession and providing social security. Thanks to the effect of financial crisis in many industries, it involved the main part of government revenue declined, moreover caused serious unbalance between expenditure and revenue, and government pressure in future.

With the time moves on, the influence of crisis became weaker, government gradually adjusted fiscal policy, therefore, we can clearly to find the fiscal deficit slightly reduced to the level before crisis.

Figure 3.2 Overall situation of US performance (percentage of GDP)

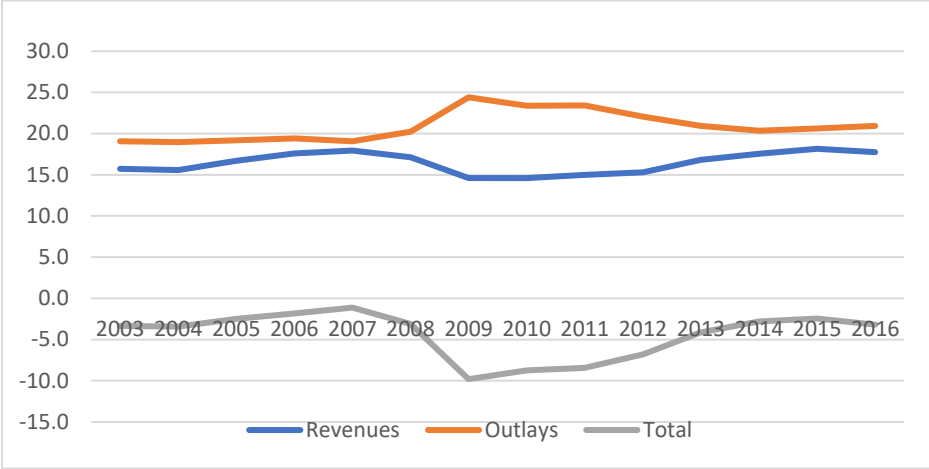


Figure 3.2 shows fiscal performance in form of percentage in GDP, combine with table 3.1, we can be clear to find the fiscal expenditure, revenue and deficit separately around 20%, 16%, -3%. But from 2008 to 2013, the increase of expenditure and decline of revenue leaded to the high deficit. Especially in 2009, the ratio is 9% which mean 9% of GDP is used to cover deficit.

After 2013, the deficit ratio gradually back to initial ratio before the occurrence of financial crisis.

3.2 The revenue of US federal government

Government revenue is mainly composed by two parts, tax revenue, debt. In this part, we introduce the detail information of tax and debt in federal state government.

3.2.1 Tax revenue

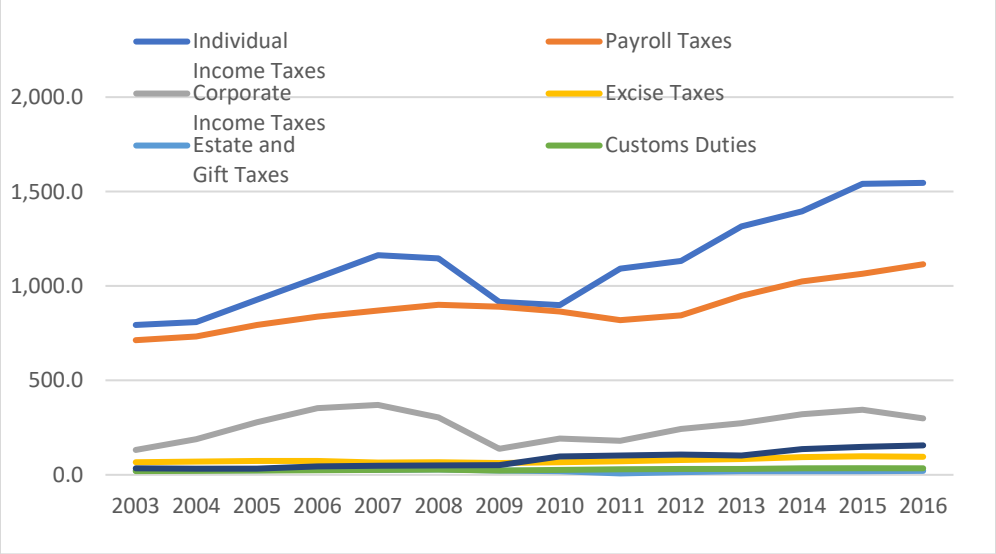
Table 3.2 The tax revenue of federal state government

	Individual Income Taxes	Payroll Taxes	Corporate Income Taxes	Excise Taxes	Estate and Gift Taxes	Customs Duties	Miscellaneous Receipts	Total
	In Billions of Dollars							
2003	793.7	713.0	131.8	67.5	22.0	19.9	34.5	1,782.3
2004	809.0	733.4	189.4	69.9	24.8	21.1	32.6	1,880.1

2005	927.2	794.1	278.3	73.1	24.8	23.4	32.7	2,153.6
2006	1,043.9	837.8	353.9	74.0	27.9	24.8	44.6	2,406.9
2007	1,163.5	869.6	370.2	65.1	26.0	26.0	47.5	2,568.0
2008	1,145.7	900.2	304.3	67.3	28.8	27.6	50.0	2,524.0
2009	915.3	890.9	138.2	62.5	23.5	22.5	52.1	2,105.0
2010	898.5	864.8	191.4	66.9	18.9	25.3	96.8	2,162.7
2011	1,091.5	818.8	181.1	72.4	7.4	29.5	102.8	2,303.5
2012	1,132.2	845.3	242.3	79.1	14.0	30.3	106.8	2,450.0
2013	1,316.4	947.8	273.5	84.0	18.9	31.8	102.6	2,775.1
2014	1,394.6	1,023.5	320.7	93.4	19.3	33.9	136.1	3,021.5
2015	1,540.8	1,065.3	343.8	98.3	19.2	35.0	147.5	3,249.9
2016	1,546.1	1,115.1	299.6	95.0	21.4	34.8	156.0	3,268.0

Source: Congressional budget office

Figure 3.3 The tax revenue of federal state government



American tax system consists of seven main taxes, they are separately Individual Income Taxes, payroll taxes, corporate income taxes, Excise Taxes, Estate and Gift Taxes, Customs Duties, Miscellaneous Receipts.

It is clearly to see from figure 3.3 and table 3.2, the main pillars of tax revenue are from individual income taxes, payroll taxes and corporate income taxes. Income taxes revenue cover large proportion in total revenue, which is almost the half of total revenue. Then is payroll tax.

From 2003 to 2008, tax revenue was growing, however due to the impact of financial crisis, many companies bankrupted, high unemployment occurred, housing price went down, the reduction of trade, these reasons caused those types of tax revenue decreased significantly, especially were income taxes and corporation taxes. Not only that, federal government implemented expansionary fiscal policy for reducing people's pressure and stimulating economy, it caused most taxes decreased in 2009 and 2010. After that, each type revenue gradually improved.

There is a type of tax revenue that increased during financial crisis in these seven types of tax revenue, which is Miscellaneous Receipts. Even if it's proportion cover few in overall, but it is still significant for total revenue.

3.2.2 Debt situation

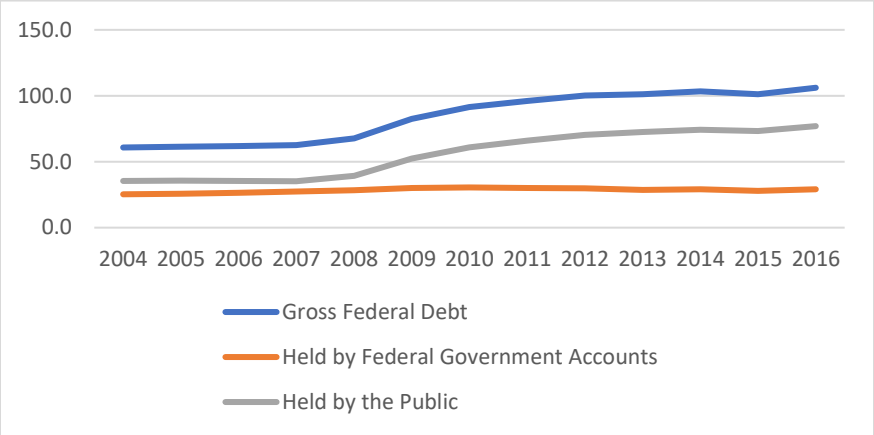
Debt is also the main way for government for finance budget. This part will describe and analysis the amount of US historic debt, and the interest payment in debt, as well as proportion of debt holders.

Table 3.3 Federal debt over last 14 years (In percentage of GDP)

	Total debt	Intragovernmental Holdings	Held by the Public
2004	60.8	25.3	35.5
2005	61.3	25.7	35.6
2006	61.8	26.5	35.3
2007	62.5	27.3	35.2
2008	67.7	28.4	39.3
2009	82.4	30.0	52.3
2010	91.4	30.5	60.9
2011	96.0	30.1	65.9
2012	100.1	29.8	70.4
2013	101.2	28.7	72.6
2014	103.3	29.1	74.2
2015	101.2	27.9	73.3
2016	106.1	29.2	77.0

Source: www. Treasuryderict.gov

Figure 3.4 Federal debt over last 14 years (In percentage of GDP)



As can be seen from table 3.3 ad figure 3.4, the total gross federal debt consists of federal government account and public. Intragovernmental Holdings are mostly made up of the Government Account Series (GAS) held by government trust funds, revolving funds, and special funds. Debt Held by the Public includes all federal debt held by individuals, corporations, state and local governments, foreign governments.

The overall trend of federal government debt was increasing in last 14 years. The increasing of total debt from 2004 to 2007 was slight, which nearly around 61% of GDP. However, started from financial crisis in 2008, in order to recover economy from recession, federal government issued a large amount of treasury security for finance budget, so, it is obvious to see the debt ratio raised sharply. Not only that the debt ratio was even above 100% in last 4 years from 67.7% of 2008, which mean the total money federal government owning is more than total amount of GDP, it would bring more burden for government in budget in future.

It is obvious to see, the debt held by the public was the main resource of total debt, which nearly cover two third in gross debt. Not only that, the movement of public debt was same with the trend of total debt, particularly after financial crisis in 2008, which reflect public debt is main resource for federal government to finance budget for stimulating economy from economic recession.

For debt held by government account and public, there was no significantly change in last 14 years, however, it is still playing important role in gross debt.

3.2.3 Change of debt

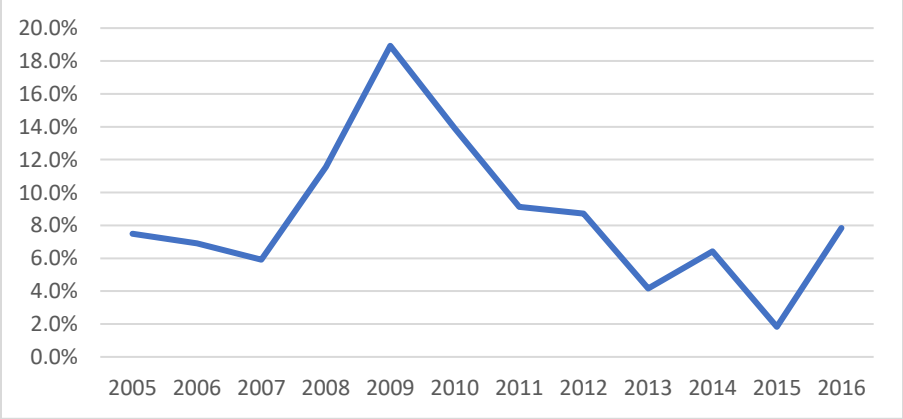
In this part, we need calculate how much net new debt federal government generate over year.

Table 3.4 Change of debt (millions of dollar)

	Gross Federal Debt	Change of debt	Ratio of debt change
2004	7,354,657		
2005	7,905,300	550,643	7.5%
2006	8,451,350	546,050	6.9%
2007	8,950,744	499,394	5.9%
2008	9,986,082	1,035,338	11.6%
2009	11,875,851	1,889,769	18.9%
2010	13,528,807	1,652,956	13.9%
2011	14,764,222	1,235,415	9.1%
2012	16,050,921	1,286,699	8.7%
2013	16,719,434	668,513	4.2%
2014	17,794,483	1,075,049	6.4%
2015	18,120,106	325,623	1.8%
2016	19,539,445	1,419,339	7.8%

Source: www. Treasuryderict.gov

Figure 3.5 Change of debt



American is the biggest debtor in the world, which total amount of debt is larger than gross domestic product. Moreover, as can be seen in figure 3.5 as well as table 3.4, there was

new debt generated each year in last 4 years, debt growth rate was relatively high that almost achieve 20 billion US dollar, which illustrate that federal government did not control expanding of debt, by contrast they generated more.

From figure 3.5, as a result of the economic shock, federal government started borrowing more money for recovering. The ratio in 2008 was the highest in last 14 years which is two times bigger than in 2007. Then, after the impact of crisis declined gradually, federal government began to reduce amount of borrowing, however the net debt growing still caused gross debt increasing.

3.2.4 Structure of debt held by public

Debt held by public is the main way to raise government budget. There are many ways for federal government to raise budget from public, in this part we will describe and analysis resource of federal government debt.

For debt held by public, it can be divided into two parts, marketable security and non-marketable security. In marketable security, it is mainly included T-bills, T-notes, T-bonds, T-tips. In the case of non-marketable security, saving fund covers significant proportion.

3.2.4.1 Federal government debt from marketable security

Table 3.5 Situation of treasury security in last 10 years (In thousands of dollar)

	Treasury Bonds	Treasury tips	Treasury notes	Treasury bills
2006	3,853	38,146	349,060	12,128,178
2007	4,145	36,352	356,465	20,920,154
2008	37,240	62,549	244,388	16,474,069
2009	35,420	287,397	332,995	13,282,780
2010	67,635	195,300	496,701	9,402,457
2011	86,919	109,444	710,236	7,194,407
2012	45,142	146,886	1,024,545	9,771,432
2013	48,073	95,920	1,098,596	12,819,597
2014	60,768	13,847	1,301,563	10,845,990
2015	33,915	-	1,344,064	8,796,586
2016	35,080	-	1,243,693	10,526,585

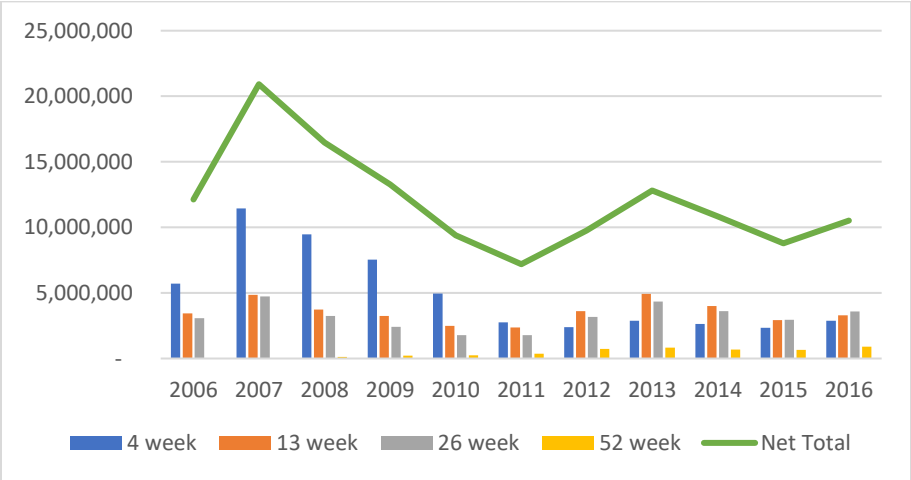
Source: www. Treasuryderict.gov

Figure 3.6 Situation of treasury security in last 10 years

According to the figure 3.6 and table 3.5, we can clearly to know treasury bill was the most important resource for federal government to finance budget from marketable security. Because of short maturity and low liquidity risk, it attracted a large number of investors to invest treasury bills.

Then is treasury note, tips and bond, even if these long-term treasury security cover little proportion, however it was significant for long-term fiscal balance. After financial crisis, government start to issue more T-notes, on the other hand, government gradually declined the issued T-bond and T-bill. In 2015 and 2016, There were two years federal government didn't finance through T-tips.

Figure 3.7 Situation of T-bill in last 10 years

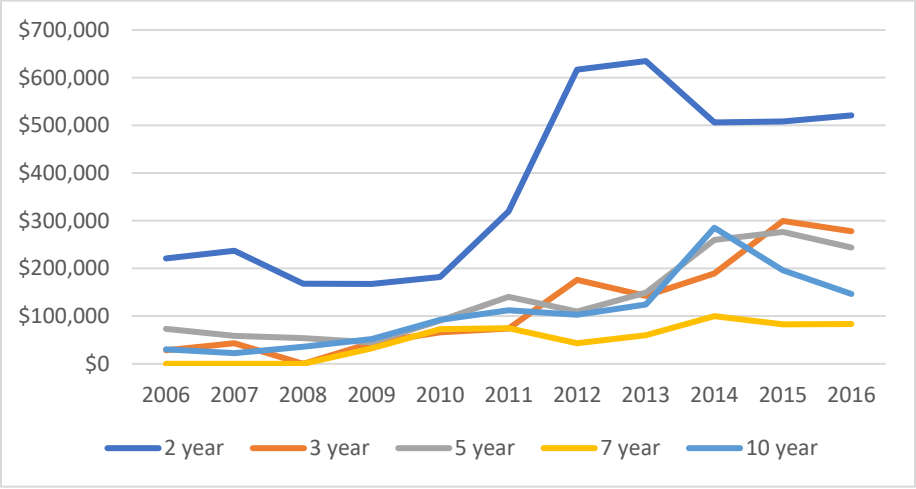


Treasury bill is kind of treasury security which the maturity is less than one year, it includes type of 4, 13, 26, 52 weeks. In the last ten years, the overall trend of T-bill was declining, as we can see from 2007 to 2008, due to the financial crisis, total amount of T-bill was higher than other years, then with time moved on, it started decreasing.

In four types of T-bill, amount of type of 4 weeks, 13 weeks were higher than other two types. During 2006 to 2010, type of 4 week was more popular, because economy began too shock, investor prefer to choose table and low risk investment, even if the yield rate was low. Started from 2011, because economy recovers from recession, type of 13 weeks and 26 weeks were accepted by more investors.

For the 52 weeks, because of the yield of return. investors preferred to choose T-note with one years rather than T-bill with 52 weeks.

Table 3.8 Situation of T-notes in last 10 years

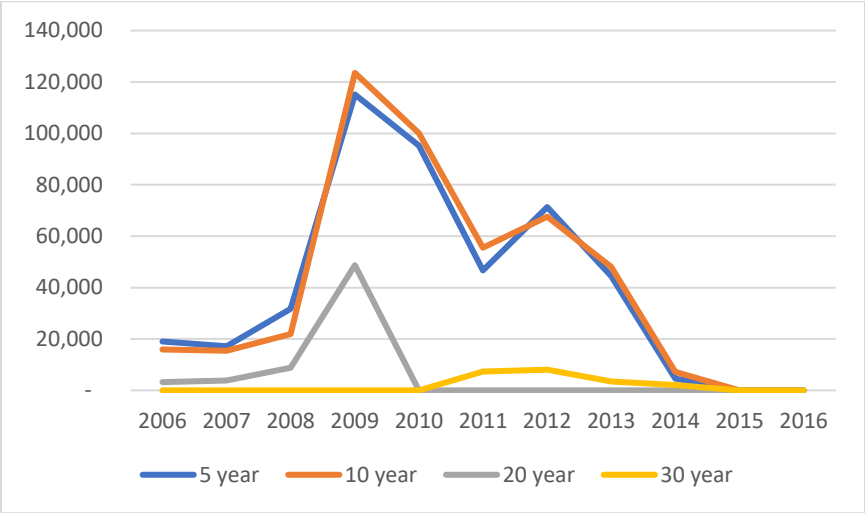


Treasury notes is middle term investment instrument for federal government to finance budget, and maturity of T-note is in two years to ten years. In the united states, T-notes is composed by 5 types, 2 years, 3 years, 5 years, 7 years and 10 years. More time period, the higher interest rate.

It is clearly to see from figure 3.8, the total trend of T-notes was increasing in last 10 years, and the most sold type of T-notes is 2 years T-notes, even if the movement of issued T-notes was unstable, but it is much more than other types. On the other hand, the amount of value of 7 years T-note had been lowest since 2011. For other 4 types, as time goes on, the

overall trend increased, which reflects federal government gradually relies on the issuing long-term T-notes.

Table 3.9 Situation of T-tips in last 10 years

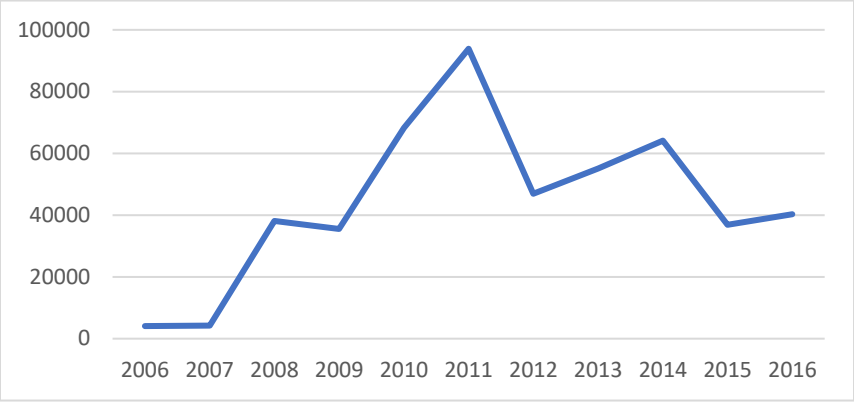


T-tips is a kind of treasury security the full name is Treasury Inflation-Protected Securities, and it provides protection against inflation. The principal of a TIPS increases with inflation and decreases with deflation, as measured by the Consumer Price Index. When it achieves maturity, government needs to pay the adjusted principal or original principal. It has 4 types, 5 years, 10 years, 20 years and 30 years.

As we can be seen in figure 3.9, the movement of 4 types T-tips was increasing from 2006 to 2009, then total amount of issued T-tips sharply declined, furthermore federal government stopped issuing T-tips. The reason caused this situation is that due to financial crisis, US economy was in recession as well as the low consumer price index, even lower than zero, not only that because of coupon rate is fixed, therefore T-tips was cheap way to finance budget and support large amount of money in economy.

After recovery of economy, the CPI was increasing, which illustrates the cost that government issues T-tips would be more expensive, so we can find that the government declined to issue more T-tips since 2009. After 2014, government stooped issuing this type of security.

Table 3.10 Situation of T-bond in last 10 years



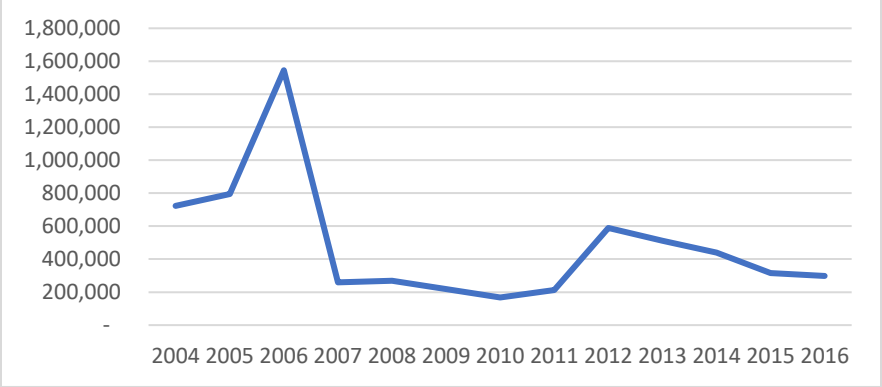
Treasury bond is the longest-term security, and the interest rate will be higher than other securities. In US, generally the T-bond is for the maturity of 30 years. According to previous part, even if T-bond cover few ratios in total debt held by public, however it is still important in long-term budget finance.

Because federal government stop selling T-bond from 2002 to 2005 for paying back previous debt, so it is obvious to see they started to issue T-bond from 2006. As the result of economy shock, they increased the issuing of T-bond until 2011, then from 2012 to 2016, the change of T-bond issued was unstable.

3.2.4.2 Federal government debt from non-marketable security

Nonmarketable securities are securities, typically debt securities, that are difficult to buy or sell due to the fact that they are not traded on any normal, major secondary market exchanges.

Figure 3.11 Situation of saving bond from 2004 to 2016



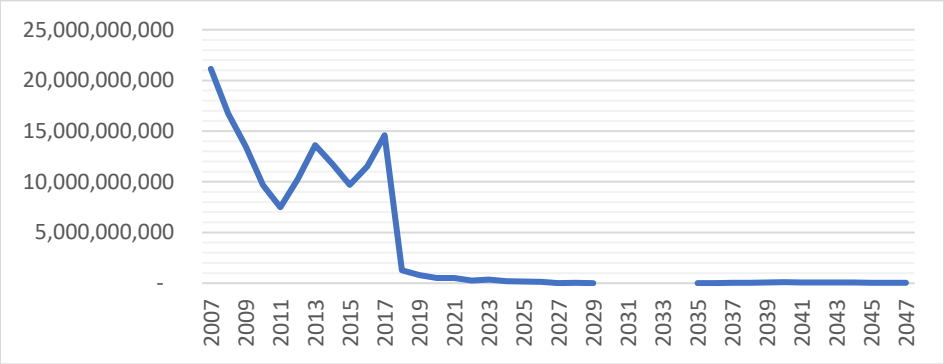
In non-marketable security, saving bond is very important in this kind of security. It is a government bond that offers a fixed rate of interest over a fixed period of time. Many people find these bonds attractive because they are not subject to state or local income taxes.

In figure 3.11, the fluctuation of saving bond in last 12 years was unstable, it increased to 2006, then sharply reduced in 2007, after that government did not issue more in saving for finance government expenditure. Focus on the period from 2008 to 2010, comparing with marketable securities, government would sale more during serious effect of financial crisis, however, federal government decreased to sell saving bond during this period, which reflects marketable security is popular and easy way to finance government budget, not only that, it is more popular than non-marketable security for investors.

3.2.5 Maturity of debt

Based on the known federal government debt, we can calculate the maturity of debt which present how much government should bay back to investors before 2017 as well as in future maturity.

Figure 3.12 Maturity of debt (millions of US debt)



Source: www. Treasuryderict.gov

It is clear to see in figure 3.12, the data before 2017 is higher than the data after 2017, the main reason is T-bill covers large proportion in total debt, not only that it is short-term investment instrument is generally less than 1 years. After 2018, the main debts are T-note, T-tips and T-bonds.

The main debts during 2018 to 2029 are T-notes and T-tips (2-20 years) , because the maturity of notes is less 10 years. From 2035 to 2047, the debts federal government should pay back are T-bonds and T-tips (30 years).

3.2.6 The treasury yield curve rate

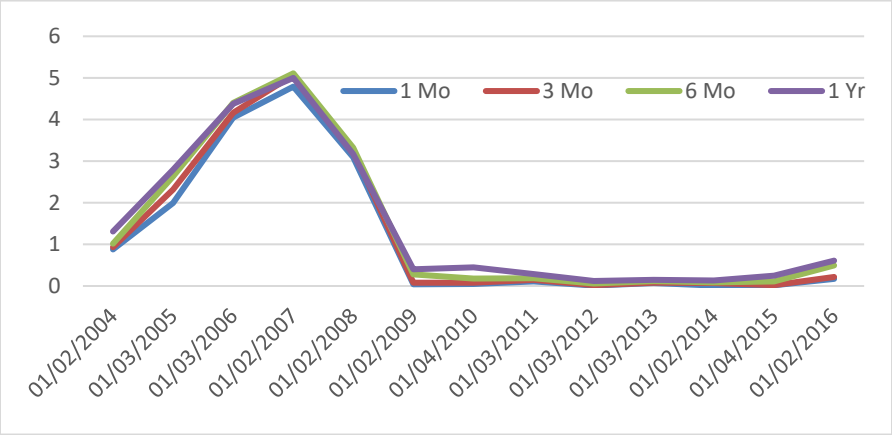
in this part, we plan to introduce and analysis the yield rate of treasury debt from 2004 to 2016, data is selected according to the first date of each year.

Table 3.5 The treasury yield curve rate (percentage)

Date	1 M	3 M	6 M	1 Y	2 Y	3 Y	5 Y	7 Y	10 Y	20 Y	30 Y
01/02/2004	0.88	0.93	1.02	1.31	1.94	2.47	3.36	3.9	4.38	5.21	N/A
01/03/2005	1.99	2.32	2.63	2.79	3.1	3.28	3.64	3.94	4.23	4.84	N/A
01/03/2006	4.05	4.16	4.4	4.38	4.34	4.3	4.3	4.32	4.37	4.62	N/A
01/02/2007	4.79	5.07	5.11	5	4.8	4.71	4.68	4.68	4.68	4.87	4.79
01/02/2008	3.09	3.26	3.32	3.17	2.88	2.89	3.28	3.54	3.91	4.39	4.35
01/02/2009	0.04	0.08	0.28	0.4	0.88	1.14	1.72	2.07	2.46	3.22	2.83
01/04/2010	0.05	0.08	0.18	0.45	1.09	1.66	2.65	3.36	3.85	4.6	4.65
01/03/2011	0.11	0.15	0.19	0.29	0.61	1.03	2.02	2.74	3.36	4.18	4.39
01/03/2012	0.01	0.02	0.06	0.12	0.27	0.4	0.89	1.41	1.97	2.67	2.98
01/03/2013	0.07	0.08	0.12	0.15	0.27	0.37	0.76	1.25	1.86	2.63	3.04
01/02/2014	0.01	0.07	0.09	0.13	0.39	0.76	1.72	2.41	3	3.68	3.92
01/04/2015	0.02	0.02	0.11	0.25	0.66	1.07	1.61	1.92	2.12	2.41	2.69
01/02/2016	0.17	0.22	0.49	0.61	1.02	1.31	1.73	2.06	2.24	2.64	2.98

Source: U.S. department of the treasury

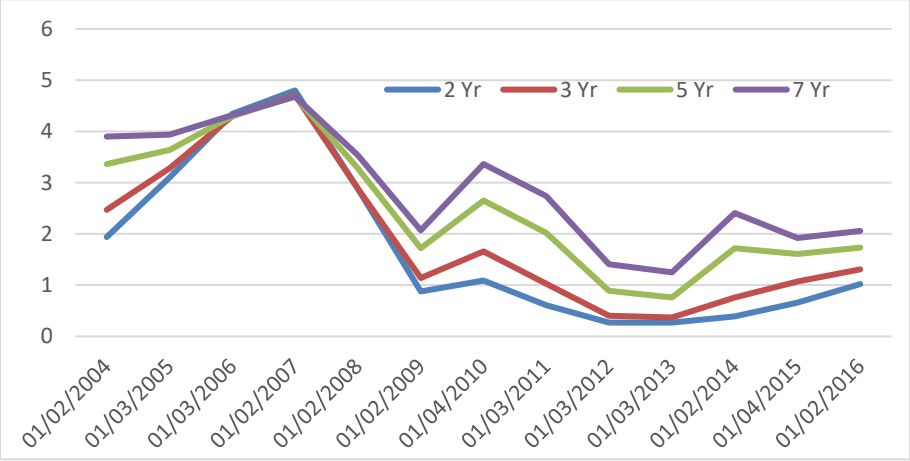
Figure 3.13 The treasury yield curve rate in short term maturity (percentage)



According to the maturity of treasury debt, we will make some figures to analysis the yield curve rate.

The figure 3.13 shows the yield rate of short term treasury debt in last 12 years which is mainly T-bills, the overall trend of short term debts is similar, due to the economic recession, moreover government was hurrying to finance budget, so federal government increased rate significantly to 2007 that rates are almost close to 5%. Then started from 2008, the rates declined under 1%.

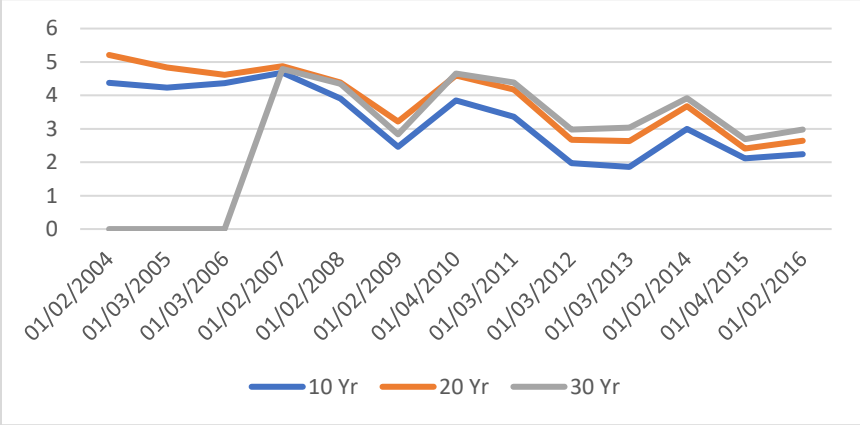
Figure 3.14 The treasury yield curve rate in middle term maturity (percentage)



The longer maturity, the higher yield rate, as we can see, the yield rate of 7 years is higher than others. Comparing with short term yield curve, the middle term rates are higher than short term rates, and the movement of middle term rates are more fluctuant than short term,

which reflects federal prefers to use T-notes and T-tips to finance budget after financial crisis.

Figure 3.15 The treasury yield curve rate in long term maturity (percentage)



The general change of long term yield rates is declining, for example the rate of 20 years decreased from 5% in 2004 decreased to 2.64% in 2016. Under the comparison of others two types of yield rate, the long-term yield rates were more flat and higher than others.

The highest yield rate is 30 years, because of debt eliminated, federal government didn't issue T-bonds before 2006. This is why yield rate of 30 years started issuing from 2006.

3.3 The outlays of US federal government

In the part 3.3, we will introduce the overall state of outlays of federal government from 2004 to 2016, then separately describe and analyze main types of government outlays.

3.3.1 The overall situation of federal outlays

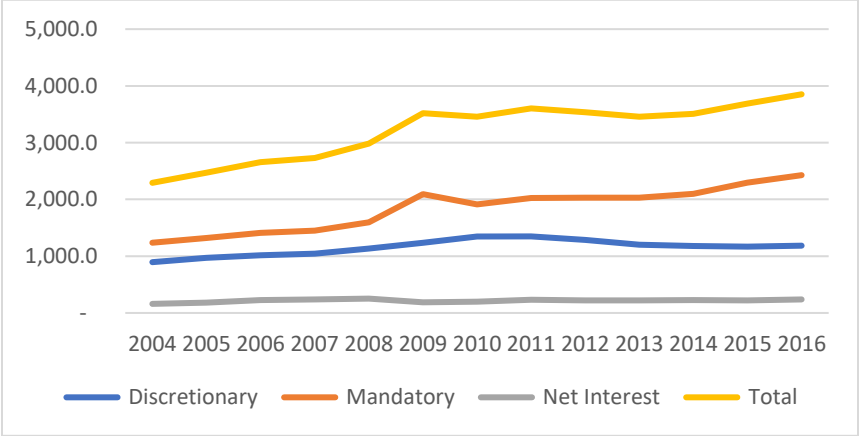
Table 3.6 Overall situation of federal spending (billions of US dollar)

	Discretionary	Mandatory	Net Interest	Total
2004	895.1	1,237.5	160.2	2,292.8
2005	968.5	1,319.4	184.0	2,472.0
2006	1,016.6	1,411.8	226.6	2,655.1
2007	1,041.6	1,450.0	237.1	2,728.7
2008	1,134.9	1,594.9	252.8	2,982.5

2009	1,237.5	2,093.2	186.9	3,517.7
2010	1,347.2	1,913.7	196.2	3,457.1
2011	1,347.1	2,026.0	230.0	3,603.1
2012	1,286.1	2,030.5	220.4	3,536.9
2013	1,202.1	2,031.6	220.9	3,454.6
2014	1,178.7	2,098.5	229.0	3,506.1
2015	1,168.7	2,296.5	223.2	3,688.4
2016	1,185.0	2,427.5	240.0	3,852.6

Source: Congressional budget office

Figure 3.16 Overall situation of federal spending



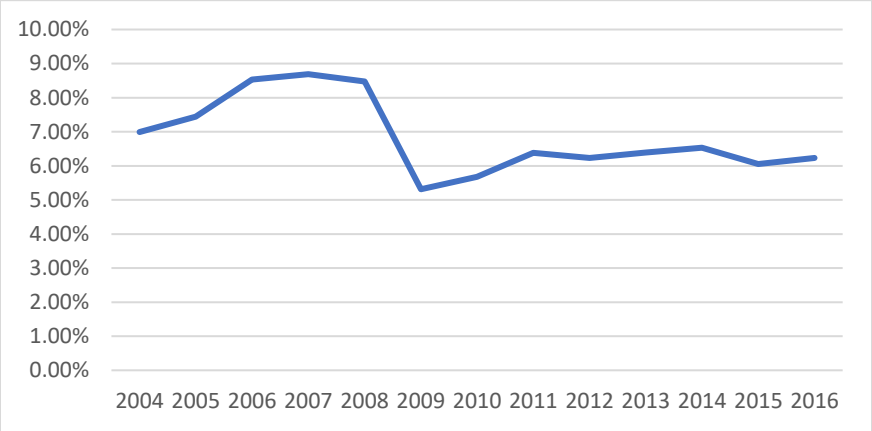
Federal outlay consists of three main parts, discretionary, mandatory and interest expenses. Discretionary spending stems are from annual appropriation acts, which are under the control of the House and Senate Appropriations Committees, mainly including defense, education, and transportation programs. Mandatory spending is mainly included Social Security, Medicare, and Medicaid. For interest spending, it refers to government pays the cost of borrowing, like debt.

Firstly, as we mentioned in previous part, the total federal spending was increasing gradually in last 12 years. Secondly, it is clearly to see in figure 3.12, mandatary spending was higher than other two types spending, which reflects federal government spent the most in total federal outlays. In 12 years, the total outlays increased from 1,2 trillion to 2.4 trillion, especially in 2008, the rapid growth reflects that federal government spent more to

release the social negative effect caused by financial crisis in 2008. After that, federal government adjusted the mandatory spending to the relatively slow growth.

For discretionary, the movement was more stable than discretionary spending, which means the strength government spent money less than social Security, Medicare, and Medicaid.

Figure 3.17 Percentage of net interest spending in total outlays



For interest expenses, it covers low proportion in total federal outlays that its average ratio is 6.8% each year. In figure 3.12 and 3.13, it is obvious to see the total amount of interest spending and ratio of interest spending were higher than the other years, according to pats relative to debt, as we know, the government issued large number of treasury bills during 2006, 2007 and 2008, not only that, due to the short-term maturity of this investment. it caused the interest cost was high in 2006 and 2007.

Because of the financial crisis in 2008, government chose the other treasury debt instead of T-bill for declining interest spending as well as increasing spending in society and economy. Therefore, started in 2008, federal government issued more middle-term and long-term investment, such as T-TIPS, T-notes and T-bonds. So, we can see the interest outlay expenses since 2009.

3.3.2 Discretionary outlays

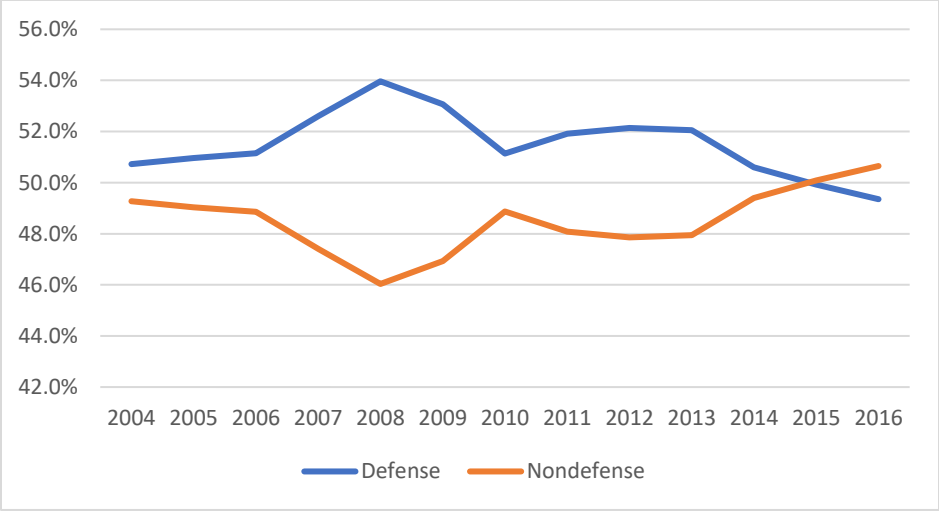
Discretionary outlays can be changed during the annual budget, and it is under the control of the House and Senate Appropriations Committees.

Table 3.18 Situation of discretionary outlays

	Defense	Nondefense	Total	Defense	Nondefense
	In Billions of Dollars			percentage of outlays	
2004	454.1	441.0	895.1	50.7%	49.3%
2005	493.6	474.9	968.5	51.0%	49.0%
2006	520.0	496.7	1,016.6	51.1%	48.9%
2007	547.9	493.7	1,041.6	52.6%	47.4%
2008	612.4	522.5	1,134.9	54.0%	46.0%
2009	656.7	580.8	1,237.5	53.1%	46.9%
2010	688.9	658.3	1,347.2	51.1%	48.9%
2011	699.4	647.7	1,347.1	51.9%	48.1%
2012	670.5	615.6	1,286.1	52.1%	47.9%
2013	625.8	576.4	1,202.1	52.1%	47.9%
2014	596.4	582.2	1,178.7	50.6%	49.4%
2015	583.4	585.3	1,168.7	49.9%	50.1%
2016	584.8	600.2	1,185.0	49.4%	50.6%

Source: Congressional budget office

Figure 3.19 Situation of discretionary outlays



Discretionary outlay includes defense and nondefense spending. For defense outlay, there are some aspects relative defense, such as military, NASA, researching weapon and

equipment maintenance. For non-defense, it contains the public transportation, education, and so on.

As we can be seen in figure 3.14, because of the anti-terrorism war since 2001 in middle east, it caused the defense spending was much more than the nondefense spending from 2004 to 2015, even if federal government reduced the defense expenses and increased nondefense expenses after financial crisis, however it was still higher than nondefense. Then due to troops withdrawal in 2014, non-defense spending started to be higher than defense spending, which illustrates government gradually transferred budget from foreign war to domestic development.

3.3.3 Mandatory outlays

Mandatory outlay is the largest spending in total federal government spending which is about 60% of total outlays. It is under protection of low, these laws mandated that Congress must have appropriate whatever funds are needed to keep the programs running.

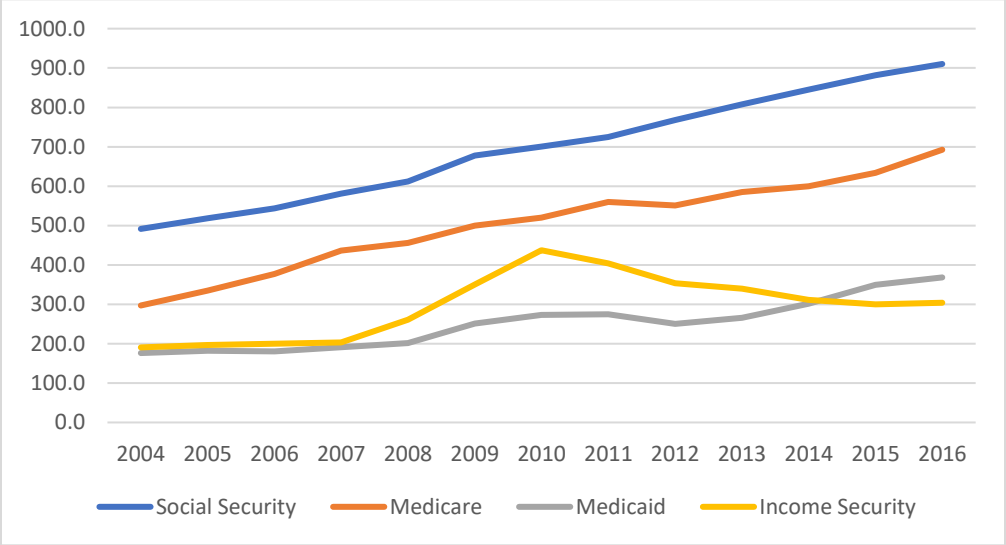
Table 3.9 Situation of mandatory outlays (billions of dollar)

	Social Security	Medicare	Medicaid	Income Security	Federal Civilian and Military Retirement	Veterans' Programs	Other Program	Offsetting Receipts
2004	491.5	297.0	176.2	190.6	103.6	31.9	55.5	-108.9
2005	518.7	335.1	181.7	196.9	109.7	40.4	65.6	-128.7
2006	543.9	376.8	180.6	200.0	113.1	38.4	103.3	-144.3
2007	581.4	436.1	190.6	203.1	122.4	38.4	55.8	-177.9
2008	612.1	456.0	201.4	260.7	128.9	44.5	76.7	-185.4
2009	677.7	499.9	250.9	350.2	137.7	49.6	321.8	-194.6
2010	700.8	520.5	272.8	437.3	138.4	58.3	-17.8	-196.5
2011	724.9	559.6	275.0	404.0	144.2	71.0	56.1	-208.8
2012	767.7	551.2	250.5	353.6	143.5	68.0	124.2	-228.3
2013	807.8	585.2	265.4	339.5	152.5	80.4	105.5	-304.7
2014	844.9	599.8	301.5	310.9	157.5	86.8	74.5	-277.3
2015	881.9	634.1	349.8	300.2	161.5	92.4	134.2	-257.6

2016	910.3	692.5	368.3	303.8	163.8	106.5	120.0	-237.6

Source: Congressional budget office

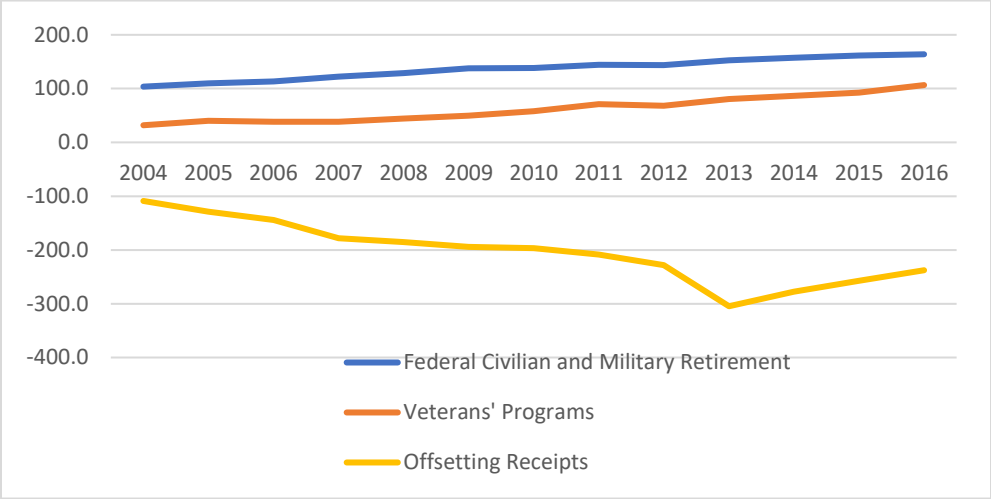
Figure 3.20 Situation of mandatory outlays



In total mandatory outlay, the four largest mandatory programs are Social Security, Medicare, Medicaid and income security. As we can see from figure 3.15, the movement of total amount of spending in social security and Medicare was increasing steadily from 2004 to 2016, the main reason is the aging structure of America, as more people require Social Security and Medicare, costs for these two programs will be almost double in the last 10 years.

For income security, it is clearly to see it increased rapidly from 2007 to 2010, due to high unemployment caused by economic shock, government expensed more for releasing people's life pressure and maintaining employment. Then after 2014, federal spending of income gradually declined, and started to be excessed by Medicaid spending.

Figure 3.21 Situation of mandatory outlays



In mandatory outlays, there are important items related to US military, such as military retirement and veterans' programs. As world's super power, US federal government not only spent the most money in defense, but also in army welfare.

From figure 3.17, it shows the outlays in military retirement and veterans' programs were increasing in last 12 years, and the total amount of these two items were more than 250 billion of dollars in 2016. Moreover, even if all country's economy was under the shock of financial crisis, government still increased spending for army's welfare, it reflects federal quite concern army protection.

For offsetting receipts, it is the difference between federal budget and actual outlays which is usually negative. According to figure, the offsetting receipts was reducing significantly, which illustrates government had effective operation in budget. It can be used in other spending.

4 Estimates and Analysis of US Long Run Public Finance Sustainability

The objective in chapter four is to evaluate the long run sustainability of federal government public finance, and analysis whether federal government has ability to finance projections. We mainly focus on budget and debt.

4.1 Federal budget

In this part, we will introduce projections of government budget in next 10 years, analysis the three types pf alternative budget balance which are separately structural, primary and current, next is the impact of Donald Trump's tax reform in 2007.

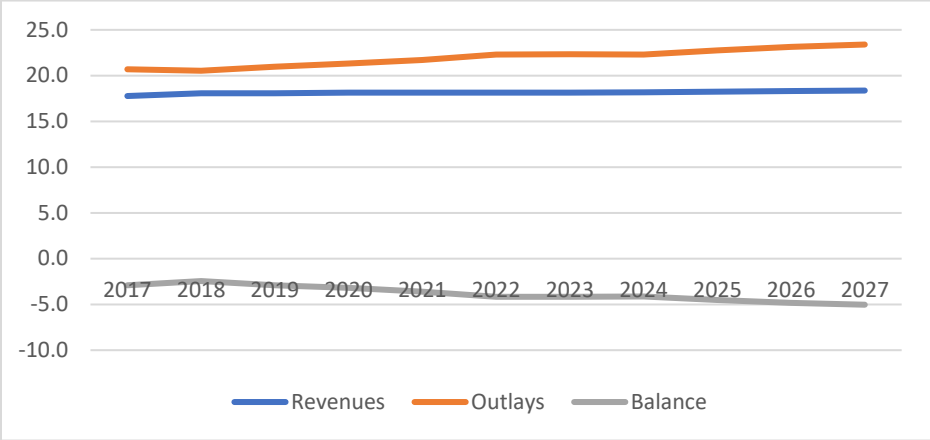
4.1.1 Projections of government budget in next 10 years

Table 4.1 Budget Projections in next 10 years

	Revenues	Outlays	Deficit	Revenues	Outlays	Balance
	In Billions of Dollars			As a Percentage of Gross Domestic Product		
2017	3,404	3,963	-559	17.8	20.7	-2.9
2018	3,604	4,091	-487	18.1	20.5	-2.4
2019	3,733	4,334	-601	18.1	21.0	-2.9
2020	3,878	4,562	-684	18.1	21.3	-3.2
2021	4,019	4,816	-797	18.1	21.7	-3.6
2022	4,176	5,135	-959	18.1	22.3	-4.2
2023	4,346	5,346	-1,000	18.1	22.3	-4.2
2024	4,527	5,554	-1,027	18.2	22.3	-4.1
2025	4,724	5,890	-1,165	18.2	22.8	-4.5
2026	4,931	6,228	-1,297	18.3	23.1	-4.8
2027	5,140	6,548	-1,408	18.4	23.4	-5.0

Source: Congressional budget office

Figure 4.1 Budget Projections in next 10 years



As we can be seen in figure 4.1, the federal future's revenue almost maintains the level of 18.1% of GDP, in contrast the ratio of federal expenditure in GDP increases in next 10 years from 20.7% in 2017 to 23.4% in 2027, therefore it will cause the deficit to grow in future.

Comparing with historic deficit ratio and future deficit ratio, it has been declining since 2008, however with the increasing of future's federal expenditure is higher than the increasing of future's federal revenue, so it leads to the fiscal imbalance become more serious.

4.1.1.1 Projections of federal revenue in next 10 years

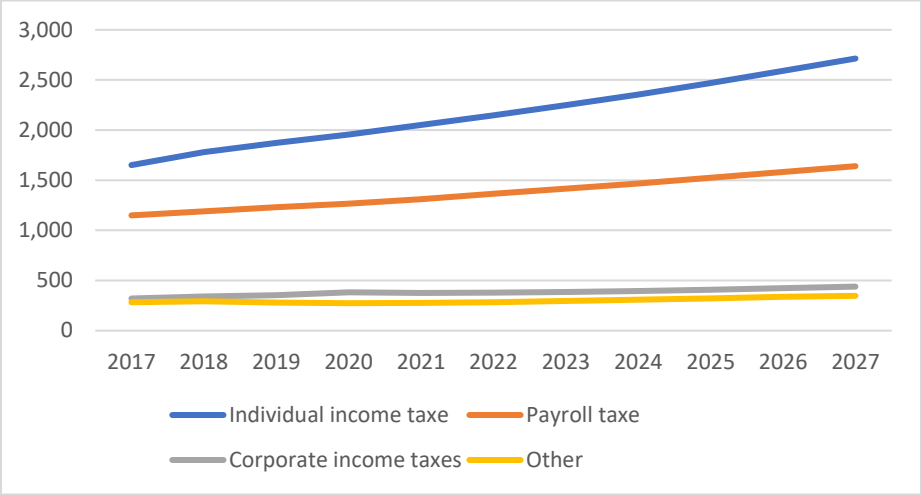
Table 4.2 Revenue Projections in next 10 years (In Billions of Dollars)

	Individual income taxes	Payroll taxes	Corporate income taxes	Other
2017	1,651	1,150	320	283
2018	1,781	1,190	340	293
2019	1,871	1,230	352	280
2020	1,957	1,265	382	274
2021	2,052	1,312	377	278
2022	2,148	1,364	381	284
2023	2,249	1,417	385	295

2024	2,355	1,468	396	308
2025	2,470	1,525	408	322
2026	2,590	1,583	422	336
2027	2,714	1,640	439	347

Source: Congressional budget office

Figure 4.2 Budget Projections in next 10 years



It is clearly to see from figure 4.2, the main pillars of tax revenue are still from individual income taxes, payroll taxes and corporate income taxes. Income taxes revenue cover large proportion in total revenue, which is almost the half of total revenue. Then is payroll tax.

According to the public budget from Congressional budget office, the individual income taxes have significant growth the revenue in 2027 is twice than 2013, which reflect individual income tax has important position in total revenue. For payroll taxes, it also increases in next 10 years, however, the increasing trend is more gradual than individual income taxes. The result of significant increasing in individual tax revenue is caused by tax cut from Donald Trump, due to the decreasing of tax rate of income in personal and companies, it can attract more American companies which located in foreign countries move back to motherland, and the low tax rate is the benefit to development and employment. Therefore, it leads the individual tax and payroll tax revenue have rapid growth.

Regarding the corporate income and others, even if rest of them have slightly growing, but they are also significant for total federal revenue.

4.1.1.2 Projections of federal outlay in next 10 years

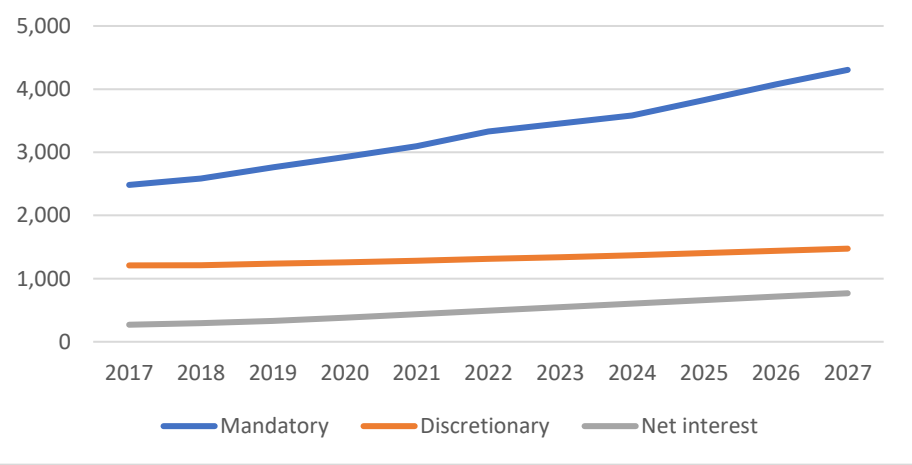
As we mentioned before, the federal outlay is composed by mandatory outlays, as well as discretionary outlays. So, we will separately introduce and analyze two types of outlay.

Table 4.3 Federal Outlays Projection in next 10 years (In Billions of Dollars)

	Mandatory	Discretionary	Net interest
2017	2,484	1,209	270
2018	2,585	1,210	295
2019	2,764	1,238	332
2020	2,925	1,257	380
2021	3,097	1,284	435
2022	3,329	1,315	492
2023	3,455	1,340	550
2024	3,583	1,367	604
2025	3,827	1,405	657
2026	4,076	1,439	714
2027	4,305	1,475	768

Source: Congressional budget office

Figure 4.3 Federal Outlays Projection in next 10 years



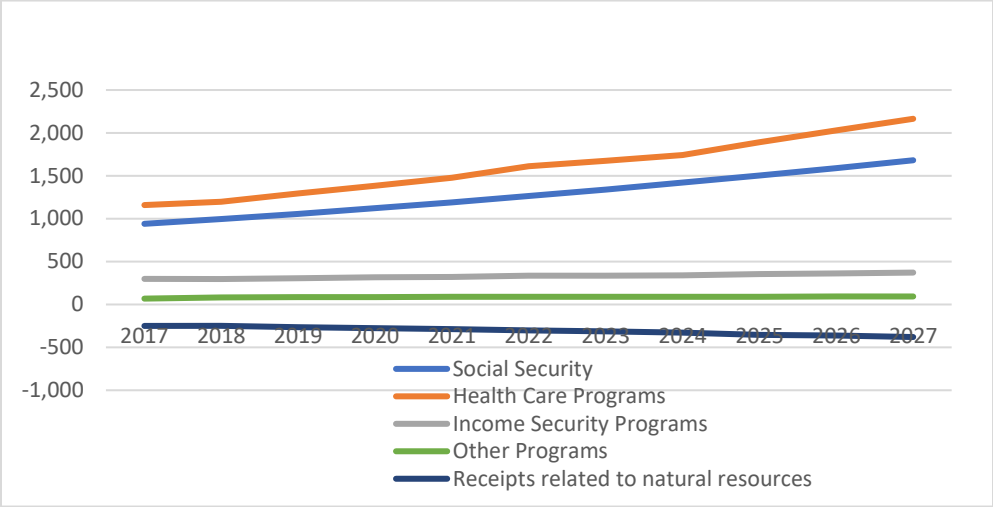
As we mentioned before, mandatory outlays have the large proportion in total federal outlays, then are the spending of discretionary and net interests. It is clear to see in figure 4.3 the mandatory spending and net interest cost will increase significant in next 10 years. Due to the US high welfare system and old aged tendency of population, federal government has to undertake pressure and continue to increase spending in mandatory projections. For the increasing of the net interest expenditure, because of the large amount of debt government hold in past, government need pay more cost for borrowing money. Not only that, with the increasing of issued debt that it is even higher than 100% of GDP, federal government will pay more interest cost in future.

Table 4.4 Mandatory Outlays Projection in next 10 years (Billions of Dollars)

	Social Security	Health Care Programs	Income Security Programs	Federal Civilian and Military Retirement	Veterans' Programs	Other Programs	Receipts related to natural resources
2017	940	1,159	299	161	106	68	-250
2018	995	1,196	297	162	101	84	-249
2019	1,056	1,295	307	170	112	87	-264
2020	1,121	1,385	315	176	116	87	-276
2021	1,191	1,477	323	183	120	90	-287
2022	1,264	1,613	335	195	134	90	-302
2023	1,340	1,676	337	197	129	89	-314
2024	1,420	1,742	340	198	123	88	-329
2025	1,504	1,891	353	206	139	90	-355
2026	1,590	2,029	362	219	143	94	-362
2027	1,681	2,165	372	225	149	93	-380

Source: Congressional budget office

Figure 4.4 Mandatory Outlays Projection in next 10 years



In the future's mandatory outlays projection, the expenditure of social security and health care programs are still playing the important roles in total mandatory expenditure, which cover two third of total outlays, not only that, both of outlays have significant and quick growth in next 10 years. For other outlays, they have gradual increasing, but their movement are slighter under comparing with social security and health care programs.

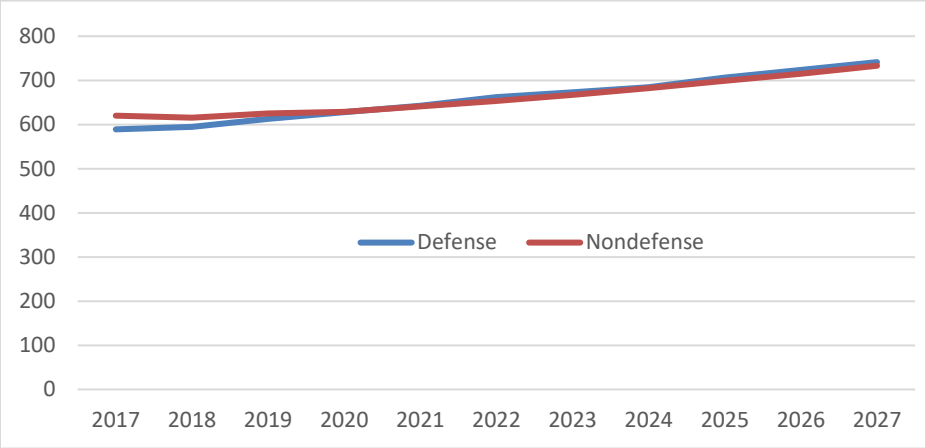
The main reason is the US imbalance aging structure and the impact of child boom. due to the low birth rate and serious aged tendency of population from child boom during 1946 to 1964, few young people cannot support well for the large number of old people, it causes government has need to spend more money and focus on social security and health care program. On the other hand, as super developed country, people's welfare is the most important indicator.

Table 4.5 Discretionary Projection in next 10 years (Billions of Dollars)

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Defense	589	595	613	628	642	662	673	685	706	724	741
Nondefense	620	616	625	629	641	653	667	683	699	715	733

Source: Congressional budget office

Figure 4.5 Discretionary Projection in next 10 years



For discretionary outlays, as we can see the figure 4.5, the total discretionary outlay increases in future budget, moreover due to the development of military and country's construction, the defense outlays and nondefense outlays have similar movement in next 10 years, and each outlay has position of 50%.

Nondefense discretionary outlays are usually higher than budget authority because of spending from the Highway Trust Fund and the Airport and Airway Trust Fund that is subject to obligation limitations set in appropriation acts. The budget authority for such programs is provided in authorizing legislation and is not considered discretionary.

4.1.2 Analysis of alternative budget balance

In general, government policy maker calculated alternative budget balance with goal of defining the differential impact of various budgetary transaction on the important macroeconomic variable. In the part, we will choose the current, primary, domestic and structure budget balance to calculate last 5 years for predicting future's situation.

4.1.2.1 Current budget balance

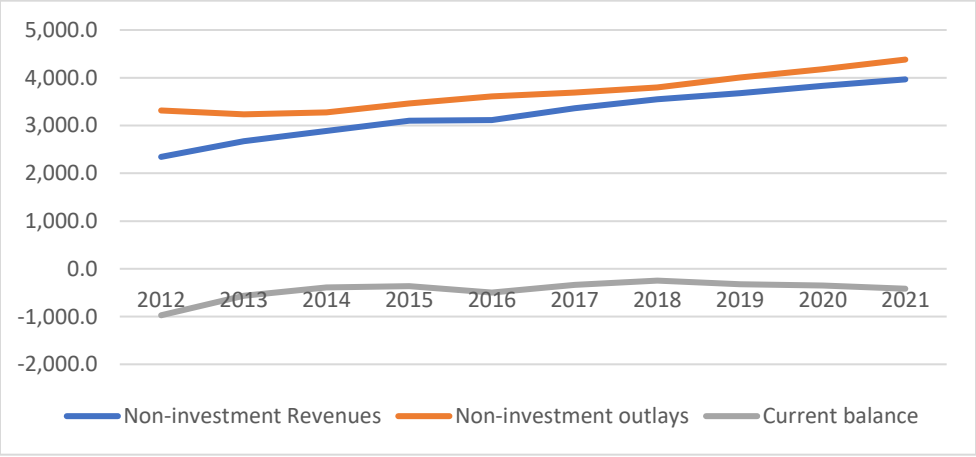
Current budget balance is the difference between non-investment revenues, and non-investment expenditures and the non-investment revenue separately exclude capital expenditure like interest payment, and Miscellaneous Receipts.

Table 4.6 US current balance in last 5 years and next 5 years

	Non-investment Revenues	Non-investment outlays	Current balance	Current balance	Standard balance
	In Billions of Dollars			percentage of GDP	
2012	2,343.2	3,316.5	-973.4	-6.1	-6.8
2013	2,672.5	3,233.8	-561.3	-3.4	-4.1
2014	2,885.4	3,277.1	-391.8	-2.3	-2.8
2015	3,102.4	3,465.2	-362.8	-2.0	-2.4
2016	3,111.9	3,612.6	-500.7	-2.7	-3.2
2017	3,358.5	3,693.1	-334.7	-1.7	-2.9
2018	3,548.3	3,795.7	-247.4	-1.2	-2.4
2019	3,678.6	4,002.2	-323.6	-1.2	-2.9
2020	3828.59	4,181.8	-353.2	-1.6	-3.2
2021	3965.66	4,380.6	-414.9	-1.8	-3.6

Source: Congressional budget office

Figure 4.6 US current balance in last 5 years and next 5 years



As we can see from table and figure 4.6, after the exclusion of interest payment and miscellaneous receipts from total expenditure and total revenue, current balance was still negative from 2012 to 2016. However, due to the increasing of non-investment revenue was faster than non-investment expenditure, so we can see the current balance gradually increased in last 5 years. Not only that, due to the miscellaneous receipts which is not from

tax revenue were lower than the interest payment, so it caused the current balance ratio is higher than standard balance ratio.

Then, based on the projected budget, we can find, due to the increasing of non-investment outlay is faster than increasing of non-investment revenue, the current balance gradually decreases in next 5 years.

The high current deficit in last 5 years (2012-2016) not only imply that federal government will undertake more pressure to finance future's mandatory outlays and discretionary outlays like social security, health care programs as well as national defense, but also federal also need pay more interest cost for the large number of borrowing money in future. Therefore, it is better for government to adjust tax activity as well as the debt ratio for dealing with the current deficit.

4.1.2.2 Primary budget balance

Primary balance can be obtained as a difference between standard balance and interest expenditures, Primary budget provides information about the impact of current year transaction on public finance.

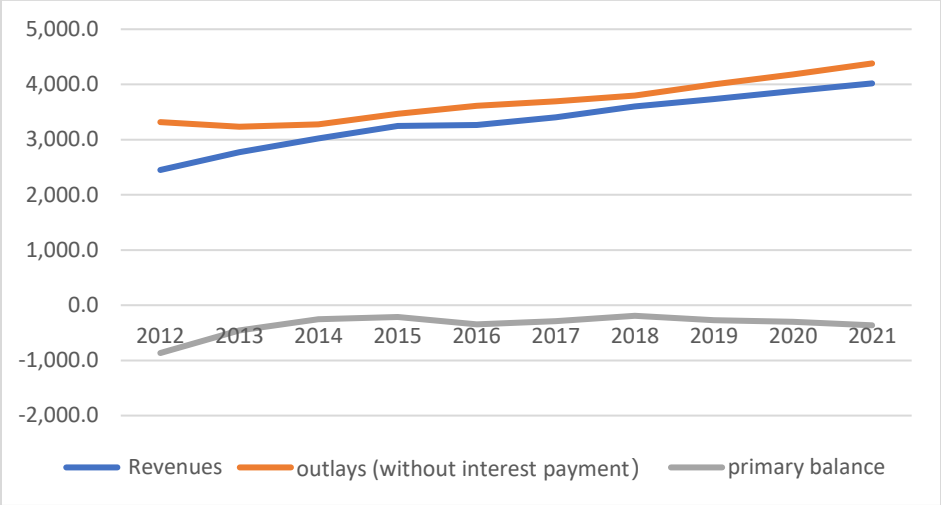
Table 4.7 US primary balance in last 5 years and next 5 years

	Revenues	Outlays (without interest payment)	primary balance	primary balance	Standard balance
	Billions of Dollars			percentage of GDP	
2012	2,450.0	3,316.5	-866.5	-5.4	-6.8
2013	2,775.1	3,233.8	-458.7	-2.8	-4.1
2014	3,021.5	3,277.1	-255.6	-1.5	-2.8
2015	3,249.9	3,465.2	-215.3	-1.2	-2.4
2016	3,268.0	3,612.6	-344.6	-1.9	-3.2
2017	3,404.2	3,693.1	-288.9	-1.5	-2.9
2018	3,603.7	3,795.7	-192.0	-1.0	-2.4
2019	3733	4002.2	-269.2	-1.3	-2.9
2020	3,878.2	4,181.8	-303.6	-1.4	-3.2

2021	4,019.0	4,380.6	-361.6	-1.6	-3.6

Source: Congressional budget office

Figure 4.7 US primary balance in last 5 years and next 5 years



It is obvious to see from figure 4.7, even if the total federal expenditure excluded the interest cost, however the federal revenue still could not cover total expenditure, which illustrates government's revenue was not enough to support future's budget like social security, health program, military and infrastructure, not only that, it can be predicted that federal government will continue to borrow money from issuing debt for financing future's budget and making up the absence of federal revenue.

In the last 5 years (2012-2016) and next 5 years, US fiscal balance still has deficit. Although the expenditure of debt cost become more and more, however, it did not occupy too much share on total expenditure. Therefore, only if the growth rate of public finance is higher than interest rate, and the growth of revenue is faster than debt, furthermore federal government continually has ability to remain primary deficit. Otherwise, government need to undertake more depression for paying back interest.

4.1.2.3 Structural budget balance and cyclical budget balance

Structural balance refers the federal balance under the situation of full employment in society, and it is not caused by the fluctuation in economic cycle. In the contrast, cyclical balance is caused by Economic cyclical fluctuation.

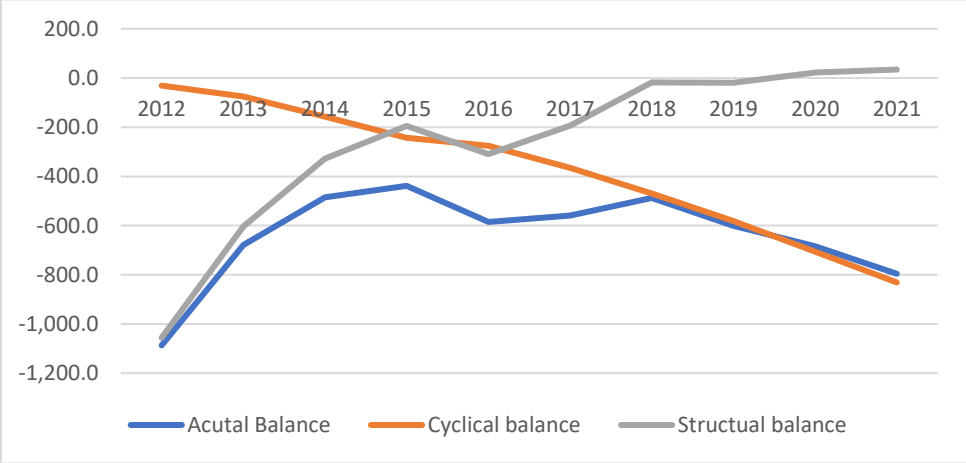
Based on the data official website of Congressional budget office, we collected data of potential GDP and nominal GDP for calculating Cyclical and structural balance.

Table 4.8 US Cyclical and structural balance in last 5 years and next 5 years （billions of US dollar）

	Potential GDP	GDP	marginal tax rate	Actual balance	cyclical balance	structural balance
2012	15,815.5	16,027.2	0.146	-1,087.0	-31.0	-1,056.0
2013	16,049.4	16,515.9	0.162	-679.5	-75.5	-604.1
2014	16,305.7	17,243.6	0.167	-484.6	-156.9	-327.7
2015	16,573.4	17,982.9	0.173	-438.5	-243.2	-195.3
2016	16,832.8	18,469.9	0.168	-584.7	-275.8	-308.8
2017	17,092.5	19,177.2	0.175	-558.7	-365.1	-193.6
2018	17,376.4	20,029.3	0.177	-487.4	-470.0	-17.5
2019	17682.2	21003.1	0.175	-601.08	-581.63	-19.4
2020	18,001.3	22,068.8	0.173	-683.6	-705.6	22.0
2021	18,332.8	23,193.7	0.171	-796.6	-831.1	34.5

Source: Congressional budget office

Figure 4.8 US Cyclical and structural balance in last 5 years



Based on the figure 4.8, it is obvious to find the structural balance covered the large proportion in total balance and it was less than cyclical balance before 2015, which reflect

mismatch between government revenue and spending. Due to the impact of financial crisis, high cost of social health care as well as the population gaps, the combination of temporary spending increases and tax cuts intended to stimulate the economy have been enacted since 2008. Therefore, the total deficit and structural deficit were quite larger in last several years.

However, it had significant decline in the last 5 years (2012-2016), which imply federal government reduced the expenditure not related business cycle. Due to economic recovery and withdrew troops from the middle east, federal budget gradually released temporary expenditure increasing as well as expenditure related to war in the middle east. For cyclical balance, it was declining in last 5 years from 31 billion US dollar in 2012 to 276 billion in 2016. Due to the increasing of actual GDP is higher than the increasing of potential GDP, it leaded the GDP gap larger in negative way, which illustrate the effect of 2008 gradually reduced and economy experiences an inflationary boom. After 2016, with the nominal GDP still grows faster than potential GDP, it caused cyclical balance lower, in contrast, structural budget balance moves in opposite way.

Although the total amount of output increased, but after consideration of inflation rate, the real GDP growth was still low. On the hand, because of the pressure of mandatory outlay, like social security and health care, federal government had to increase the expenditure.

4.1.3 Estimate of the impacts of Donald Trump's tax reform

On the December 22, 2017, the new US president Donald Trump signed document of tax cut and job act that it will decrease tax rate for individual and corporates. In this part, we will introduce the detail of tax reform and estimate the impact of tax reform.

4.1.3.1 Income tax

The document presents seven new different types of tax rate, and it will be carried out since 2018. The income levels will rise each year with inflation, so income level will be change with time moves on.

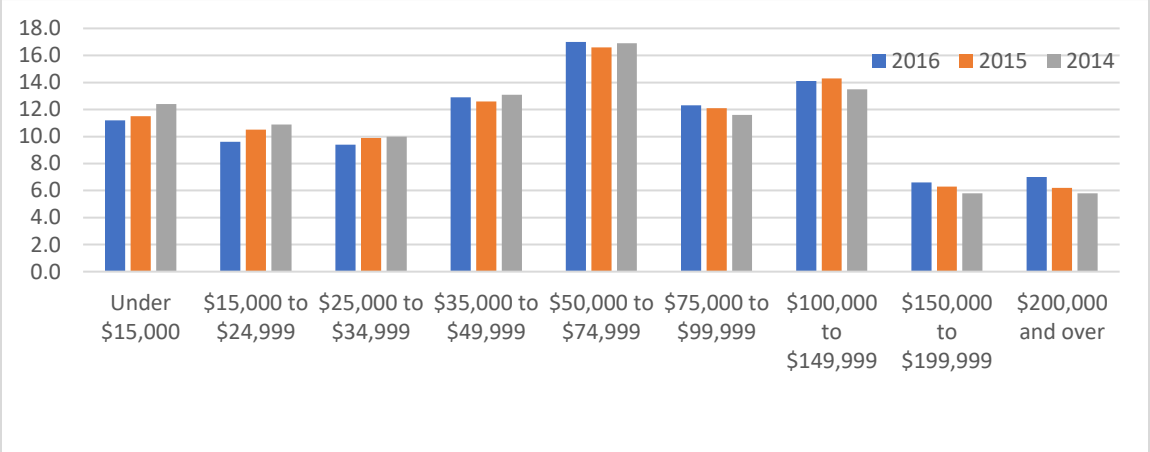
Table 4.9 Income tax rate

Income tax rate		Income level (US dollar)	
Old version	New version	Single	Married

10%	10%	0-9,525	0-19,050
15%	12%	9,525-38,700	19,050-77,400
25%	22%	38,700-82,500	77,400-165,000
28%	24%	82,500-157,500	165,000-315,000
33%	32%	157,500-200,000	315,000-400,000
35%	35%	200,000-500,000	400,000-600,000
39.60%	37%	500,000+	600,000+

Source: CONGRESS.GOV

Figure 4.9 Percentage of income level



Source: United states Census Bureau

As we can see in the table 4.9, all types of new tax rate are significantly lower than previous version, especially for the middle class the tax rate from second level to fourth level, the tax rate almost cut by 3% or 4%. It is clearly to see from figure 4.9, the population of middle class occupy the largest proportion which is nearly 50% of total adult population, it can increase more in their disposable income and has significant influence for country's development, because the consumption level, life style as well as consumption preference generally can affect and lead the social development.

On the other hand, it would help higher-income families, Tax rates are lowered for everyone, but for the total tax deduction, it would help higher-income families. The Tax Foundation said those in the 95-99 percent range would receive a 2.2 percent increase in

after-tax income. Those in the 20-80 percent income range would receive a 1.7 percent increase.

However, due to the revenue of income tax is the most important for federal budget, the reduction of tax rate would reduce the federal revenue, furthermore, it will increase the deficit by one trillion US dollar in the next 10 years according to Joint Committee on Taxation. It would cause the deficit's growth increase by 0.7% annually as well as 1.5 trillion from revenue loss.

4.1.3.2 Business tax

American has one of the highest corporate tax rate in the world, the document lowers maximum rate from 35 percent to 21 percent, the lowest since 1939. Not only that, the tax plan helps businesses more than individuals, because business tax cuts are permanent, while the individual cuts expire in 2025.

For the impact of corporate tax rate cutting, it will directly decrease the cost of tax payment, then get more profit for future's investment and financial market, not only that, it will create more vacancy of employment and increase worker's wage. The cutting of tax rate for business is also beneficial for personal income tax, employees can receive more salary due to the business tax cutting, furthermore it is better for federal personal income tax, even if the tax rate of personal income decreases, but the growth of salary can release the loss of federal revenue caused by tax cut.

Rate cutting also can attract more and more foreign companies and domestic companies which are in other countries invest back to US territories and reduce the trade deficit. Even if tax is one of the most important factor to influence company's investment strategy, but it is not only one. On the other hand, due to saving and investing revenues so that more capital is available for future growth, or to sustain the business through hard times, would be the smarter decision for many businesses, corporate tax cutting will cause company spends more money in company's development, meanwhile invest and save more in financial market.

4.1.3.3 Other impact

The document not only influences individual net income as well as corporate's net income, but also it boosts GDP by 1.7 percent a year. It would create 339,000 jobs and add 1.5 percent to wages. However, due to the decrease in tax revenue, it expands federal deficit and challenge federal government to finance budget in the future.

Table 4.10 Future's debt situation (In millions of US dollar)

	Gross Federal Debt	Held by Government Accounts	Held by Public
2017	20,354,398	5,530,582	14,823,815
2018	21,093,276	5,740,229	15,353,047
2019	21,839,988	5,882,625	15,957,363
2020	22,503,321	5,994,296	16,509,025
2021	23,114,088	6,090,473	17,023,615

Source: www. Treasuryderict.gov

In debt, increasing in deficit would increase interest rate by federal reserve for borrowing more money, it would growth ratio of debt to GDP higher for covering old debt through new debt, furthermore, the high cost from borrowing would increase federal expenditure and deficit.

As according to the able 4.10, we can see the table 4.10, the total amount of issued bet will increase in next 5 year, and mainly composed by public, which mean potential federal outlay will increase. Therefore, increasing in sovereign debt dampens economic growth in the long run, treasury debt will be expanded more as same as snow ball and easy to take palace debt crisis when debt reaches uncontrollability.

On the other hand, due to crowding out effect, the situation of high deficit also leads to high interest rate as well as high borrowing cost, and because covers lots of investment in society, most of private investment will be crowed out.

4.2 Debt

In this part, it mainly consists of fiscal gap as well as debt sustainability, we will analysis the situation of federal fiscal imbalance in future and evaluate the indebtedness for judging the ability federal government pay back debt.

4.2.1 fiscal gap

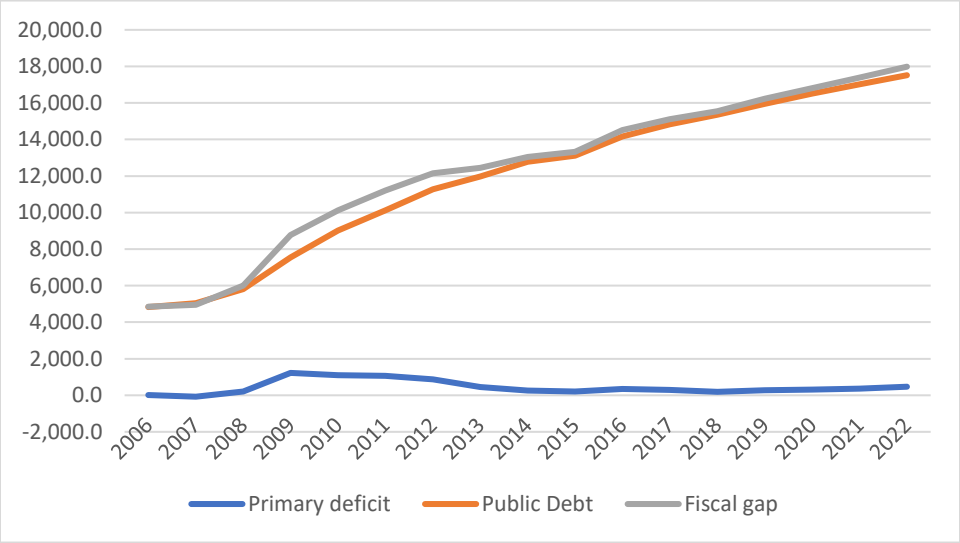
Fiscal gap presents discounted value of the difference between projected government expenditures (including debt management costs) and projected revenues in the future. We will base on projcted budget to analysis the sustainability.

Table 4.11 Fiscal gap (In billions of US dollar)

	Revenue	Outlay (without interest)	Primary deficit	Public Debt	Fiscal gap
2006	2,406.9	2,428.4	21.5	4,829	4,850.5
2007	2,568.0	2,491.6	-76.4	5,035	4,958.6
2008	2,524.0	2,729.8	205.8	5,803	6,008.8
2009	2,105.0	3,330.8	1,225.8	7,545	8,770.8
2010	2,162.7	3,260.9	1,098.2	9,019	10,117.2
2011	2,303.5	3,373.1	1,069.6	10,128	11,197.6
2012	2,450.0	3,316.5	866.5	11,281	12,147.5
2013	2,775.1	3,233.8	458.7	11,983	12,441.7
2014	3,021.5	3,277.1	255.6	12,780	13,035.6
2015	3,249.9	3,465.2	215.3	13,117	13,332.3
2016	3,268.0	3,612.6	344.6	14,168	14,512.6
2017	3,404.0	3,693.2	289.2	14,824	15,113.2
2018	3,604.0	3,795.6	191.6	15,353	15,544.6
2019	3,733.0	4,002.1	269.1	15,957	16,226.1
2020	3,878.0	4,182.0	304.0	16,509	16,813.0
2021	4,019.0	4,380.9	361.9	17,024	17,385.9
2022	4,176.0	4,643.4	467.4	17,517	17,984.4

Source: Congressional budget office and www. Treasuryderict.gov

Figure 4.11 Fiscal gap



The fiscal gap is the sum of primary deficit and public debt, as we can see from table 4.11, the public debt is most important component which covers the most in total fiscal gap. Based on the historical fiscal data and projected fiscal data in Congressional budget office, we used the formula of fiscal gap in part 2.5, we can figure out the projected fiscal gap from 2006 to 2022.

It is obvious to see from figure 4.11, the totally trend of fiscal gap growths rapidly from 2006 to 2022, especially from 2008 to 2012. Due to the influence of financial crisis in 2007, central government had to implement the expansionary fiscal policy to increase government expenditure for stimulating economy from recession and providing social security as well as unemployment supporting, so it caused US fiscal deficit and public debt started increase sharply, furthermore caused the fast increasing of fiscal gap. After 2012, with the declining of primary deficit, the increasing of fiscal gap gradually slow down.

It is clearly to see in figure 4.11, the fiscal gap from 2017 to 2022 has stable increasing and the primary deficit is in relatively low position. There are two main factors cause the situation, firstly, as we mentioned in 4.1.2.2, the primary deficit in next 5 years is around 1.5% of GDP, therefore, due to the low primary deficit in future, it causes the stable increasing of debt and fiscal gap. For the perspective of public debt, because the deficit causes the debt ceiling to increase continually, this is reason why fiscal gap keep increasing.

4.2.2 long run fiscal sustainability

This section is for analysis of debt sustainability as well as assessment of institutional strength and quality of policies, furthermore we will predict debt sustainability in future.

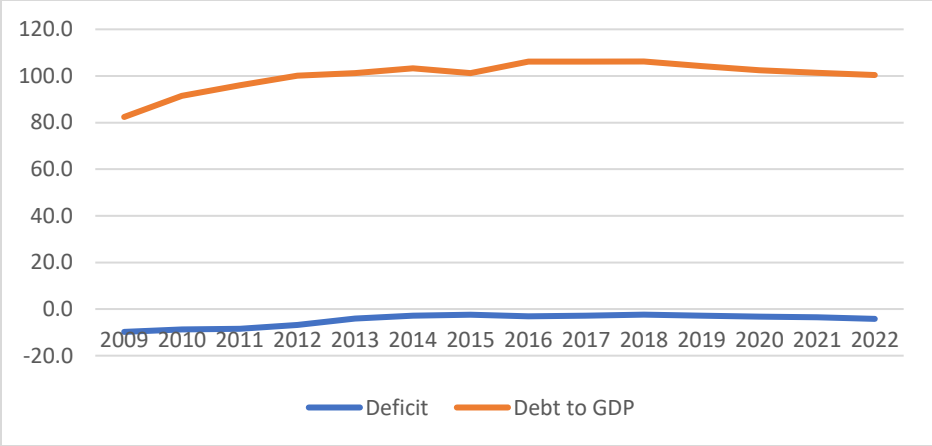
4.2.2.1 Sustainability of Public Finance

Table 4.12 short-term and long-term sustainability (percentage of GDP)

	Fiscal Balance	Debt to GDP
2017	-2.9%	106.2
2018	-2.4%	105.4
2019	-2.9%	104.3
2020	-3.2%	102.4
2021	-3.6%	100.1
2022	-4.2%	97.5

Source: Congressional budget office and www. Treasuryderict.gov

Figure 4.11 short-term and long-term sustainability (persentage of GDP)



Deficit ratio is used to evaluate federal's short-run sustainability in budget, it has mentioned in previous part, due to federal government cut down the increasing of federal outlay after financial crisis, the federal deficit had significant decline from until -9.8% in 2008 to -2.4% in 2015. However, it starts from 2018, the projected deficit will gradually increase, as we can see in figure 4.11, the projected deficit is from 2.9% of 2018 to 4.2%

of 2023, the most direct reason is the Act that new president Donald Trump's new tax reform, decreasing the tax rate for individual and corporates.

For the long-run sustainability, debt to GDP is the main indicator to evaluate. It is obvious in figure 4.11, in the next 7 years, the projected debt ratio will decrease from 106.1% in 2017 to 99.5% 2023 and still close to 100%. The reason is that the projected interest rate is lower than GDP growth, even if federal reserve rises the interest rate in 2017, furthermore, it causes the increasing of debt slower than increasing of GDP.

As we can observe in figure 4.11, there is positive correlation between deficit and debt ratio, the debt will be large when deficit increase seriously like in 2008. Moreover, with the considerable projected GDP growth in future, it will lead to the will decline debt ratio, even if the deficit has slight increasing.

4.2.2.2 Sustainability of External Debt

External debt refers to the total public and private debt owed to nonresidents repayable in internationally accepted currencies, goods or services, where the public debt is the money or credit owed by any level of government, and the private debt is owed by private households or private corporations based in the country under consideration.

It refers to an entity's ability to pay its debt or meet its long-term financial obligations, and make sure if the government has enough resources in the future to service the debt accumulated from the past. In addition, external debt and export of good and service should be added.

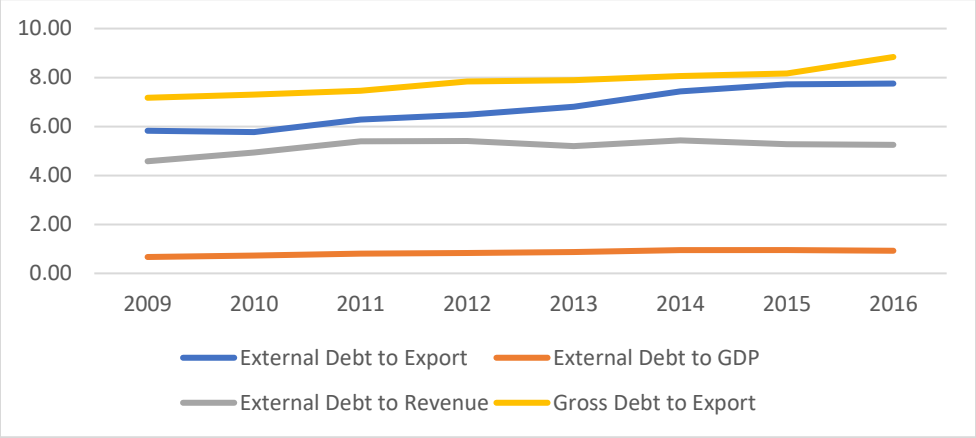
Table 4.13 Solvency ratios for debt sustainability analyisis

	External Debt to Export	External Debt to GDP	External Debt to Revenue	Gross Debt to Export	External debt (millions of US dollar)
2009	5.82	66.9%	4.58	7.17	9,640,560
2010	5.77	72.2%	4.94	7.30	10,691,397
2011	6.29	80.9%	5.40	7.46	12,439,576
2012	6.48	82.7%	5.41	7.84	13,261,270
2013	6.80	87.3%	5.19	7.89	14,410,490
2014	7.43	95.2%	5.43	8.06	16,416,776

2015	7.73	95.3%	5.27	8.17	17,134,439
2016	7.75	92.8%	5.24	8.84	17,139,236

Source: U.S department of the treasury

Figure 4.12 Solvency ratios for debt sustainability analyisis



Based on the table 4.13, we can see the external ratio was increasing significantly that it was from 67% in 2009 to 92.8% in 2016, which illustrated that the most of debt federal government and private insititutions issued are bought by oversee investors and the increasing of external debt was higher than the increasing of GDP growth, on the other hand, it was the main resource of total debt.

Moreover, due to the growth of export was lower than the increasing of external debt, it caused the external debt and gross debt to export increase as well. These two export ratios reflect the ability that country generates sufficient foreign exchange to meet its future's external debt was thinly improving. Not only that, these two export ratios in last 8 years were higher than the 200 of CPIA score, which mean institutional strength and quality of policies were strong.

For the ratio of external debt to revenue, because of the unstable tax revenue, the ratio kept the moving between 5 and 6 in last 8 years, and higher than 300 of CPIA score, which mean the strong policy in quantity of policies. However, the ability that federal government pay back external debt through federal revenue didn't have obvious changing.

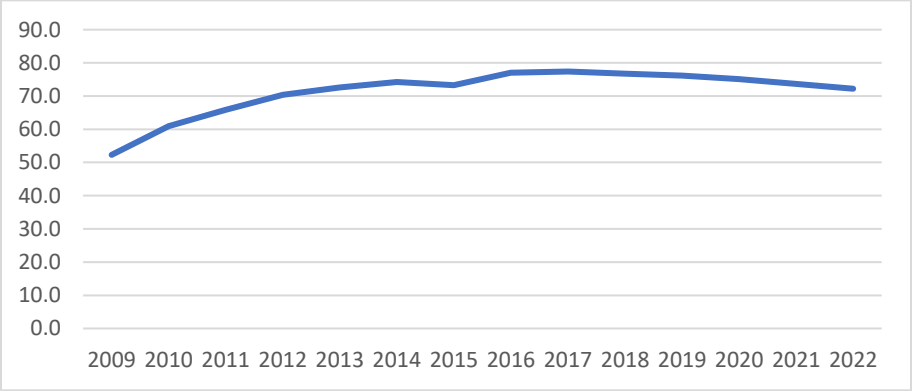
4.2.2.3 Sustainability of Public Debt

Table 4.14 Public debt in next 5 years (persentage of GDP)

	Gross Federal Debt	Held by Federal Government Accounts	Held by the Public
2017	106.2	28.9	77.4
2018	105.4	28.7	76.7
2019	104.3	28.1	76.2
2020	102.4	27.3	75.1
2021	100.1	26.4	73.7
2022	97.5	25.3	72.2

Source: www. Treasuryderict.gov

Figure 4.13 Ratio of projected public debt



Based on the previous part, we combined the historic public debt and future public debt to make the figure 4.13.

As we can see in the next 6 years, the public debt has slightly declining from 77% in 2016 to 72.2% in 2022, but still higher than 70%. Due to federal government slows down the borrowing, and the economy grows stably that the GDP growth is quicker than the increasing of new debt, it causes government to control the debt issued and pay back previous debt for releasing the risk from debt, like depreciation of US dollar, and capital outflow.

5 Conclusion

The US fiscal imbalance and the rapid increasing of debt have been hot issues since financial crisis in 2008, now more and more people start concerning about US fiscal and debt situation, because it will affect global economy significantly.

The goal of the thesis is to analyze the causes and consequences of the US fiscal imbalance and estimate the Long run finance sustainability. Based on the above analysis and research, we give conclusion for the whole thesis.

The thesis can separate 5 chapters, the first part is the introduction, the conclusion is the last part. The main chapters are the chapter 2, chapter 3 and chapter 4. Each chapter has their own function, they also can be referenced in other parts.

In the second chapter, we described in detail of the government revenue, expenditure and fiscal balance at the beginning. Then we introduced the detail of debt, meanwhile explained the way to reduce high debt. Next is the causes and consequences of the deficit. Fourthly, we mainly described the definition of alternative balance budgets (current balance, primary balance, domestic balance, structural and cyclical balance). In the end, we introduced the principle part of long run finance sustainability, which includes the external debt and public debt sustainability.

For chapter 3, we analyzed and described US fiscal performance in last twelve years. The fiscal deficit had significance changing in last 12 years, except 2006 and 2007, the deficit of rest fiscal years was higher than 3%, after financial crisis in 2008, due to stimulation of economy as well as the social welfare, the deficit increased sharply after three years of 2008, which even achieved 9.8% in 2009, then with gradual recovery from financial crisis, the fiscal deficit started declining, however, it was still higher than 3 percent. For the federal revenue and expenditure, main revenue was from tax revenue that individual income tax, payroll tax and corporate tax cover the two thirds of total revenue, and the expenditure in social security, medical caring and income security were main expenditure programs which covered large proportion in total expenditure. In the term of debt, debt ratio was increasing obviously in past, especially public debt, which occupied more than two third of total, more specify, in the types of marketable securities, the most of money

federal government borrowed was from the issue of treasury notes and bills, in order to finance more budget in society and economy, the yield rate was high during 3 years after financial crisis.

In the chapter 4, at the beginning we collected federal projected budget from congressional budget office and analyzed the long run finance sustainability. The projected deficit in next 10 years decrease obviously, the predicted deficit will be 5% in 2027. Due to the tax cut act from president Trump, it leads the increasing of federal revenue is slower than the growth of federal expenditure. In federal outlay, due to the payment of the large amount of accumulative debt, the increasing of the interest payment and mandatory outlay is still sharply, but the trend of discretionary outlay is relatively steadier. Then, we based on the projected budget to calculated alternative budget balance, the primary deficit is smaller than current deficit, because current balance only uses tax revenue, but primary balance. For structural and cyclical balance, cyclical balance become smaller and smaller, because the increasing of GDP is faster than the potential GDP, therefor, in contrast the structural balance increase in next several years. Thirdly, we analyzed and estimated the fiscal debt and fiscal sustainability. Because of the slow growth in federal revenue and the increasing in debt, it causes US fiscal gap still increase in next 5 years, and federal government does not have willingness to cut down expenditure and debt. In fiscal sustainability, we analysis public finance sustainability through indicators of deficit ratio and debt ratio, the deficit ratio in next 5 years will keep under 5%, federal government gradually decrease debt ratio which is from 106% in 2017 to 97% in 2021. For debt sustainability, even if the total amount of external debt and public debt increase, but the growth of GDP will not cause more change in relative ratios.

In total, fiscal deficit and debt can be helpful for a country's economy and society welfare, but too much deficit and debt would enhance the burden of government and people, just like snow ball, it will be bigger and bigger. Only if the efficiency of debt using is high, and government can be cautious to use debt, fiscal imbalance will serve us rather than we serve them.

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List of Abbreviations

ED: External debt

FG: Fiscal gap

G: Government expenditure

PGDP: Potential gross domestic product

PD: Public debt

T: Tax rate

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